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Effective 1 June 1987 JPRS reports will have a new cover design and color, and some reports will have a different title and format. Some of the color changes may be implemented earlier if existing supplies of stock are depleted.

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JPRS-ELS-87-031
10 JUNE 1987

SCIENCE & TECHNOLOGY

EUROPE & LATIN AMERICA

CONTENTS

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FOKKER PARTICIPATION IN A330, F100, SUBSIDIES DISCUSSED

Rotterdam NRC HANDELSBLAD in Dutch 2 Apr 87 p 10

[News analysis by NRC HANDELSBLAD staffer Pieter Graf: "Public Accounts Committee Criticism of Fokker Largely Unfounded"]

[Text] Rotterdam, 2 Apr--"When Fokker decided to produce the new Fokker 50 and Fokker 100 aircraft and to use a major portion of its production capacity for that purpose, participation in the Airbus program took a distinctly lower priority. This shows up in such things as the decision not to participate in the development of Airbus's newest project (the A320)."

These words come from the Public Accounts Committee's report for 1986. The passage has a critical undertone, given the sentence which precedes it, which reads: "Because of this (the very modest participation in the A330 and A310 projects--P. Graf), Fokker has a negligible influence on Airbus activities." What the Public Accounts Committee fails to note is the reasons why Fokker launched its own 50 and 100.

In 1979 the merger with the Vereinigte Flugtechnische Werke (VFW) in Bremen had failed and Fokker once was on its own. The F28 was doing badly and a new aircraft (later known as the F29) was being developed to keep Fokker's head above water. Market research also revealed that the airlines needed a considerably larger aircraft.

Douglas

Development costs for that aircraft were far above the Fokker budget so the board of directors went in search of a partner. Things did not work out with Airbus and Boeing ignored the small manufacturer but in early 1981 a cooperation agreement was reached with McDonnell Douglas Corporation (MDC) to develop and then jointly produce a 150-seat aircraft, the MDF100. This cooperation broke up scarcely a year later because of "the lack of a suitable engine, structural changes in the market, and the lack of launching customers," the Public Accounts Committee writes.

At that moment Fokker's shelves were almost bare, particularly since the successful F27 too was approaching the end of its life cycle. In 2 years' time the company managed to launch the Fokker 50 to replace the F27 and the

Fokker 100 to replace the F28, an accomplishment that astonished many. Furthermore, the decision was made in 1984, a year in which the dollar was worth 3.5 guilders, on the average.

Good Nose

A considerable time after Fokker had decided to produce the 50 and 100, Airbus came along with its 150-seat A320. To have waited for the A320 --it was long uncertain whether or not it would ever be produced-- would probably have meant the end of Fokker. Fokker itself could not have financed the period of idleness and it must not be assumed that the government would have covered the losses from running idle in the very year of the RSV [Rijn-Schelde Verolme] inquiry. The period of purely defensive government support had passed.

Equally incredible is the idea that the government, with agreement from the Second Chamber of Parliament, would have given Fokker 4 billion guilders in development credits in 1982 to develop a 150-seat aircraft on its own. If the government had done so, Fokker could have been the first manufacturer in the world to offer such an aircraft. Since then Airbus's A320 has shown that it would have been an absolute success. This shows Fokker's limitations as a relatively small company. But at the same time it indicates that Fokker has an exceptionally good nose for some things.

Thirty Years

That Fokker still has "a negligible influence" on the activities of Airbus Industrie (the Public Accounts Committee consistently and incorrectly writes "Airbus Industries"--P. Graf) is understandable. Among large companies like Aerospatiale and British Aerospace, its influence can never be great. But suppose that in the 1970's Fokker had bought into Airbus and did have some influence; this would have had consequences as follows. First, Fokker would be a considerably smaller company than it now is because there would have been hardly any money left over for other projects.

Second, the Netherlands taxpayer would have had to reach deep into his pocket. Reports about the billions that the governments of France, the FRG, and the United Kingdom have pumped into Airbus Industrie speak for themselves. In that case the Public Accounts Committee would not have had to write of Fokker as it did that"non-repayment of credits produces a silent transition to subsidization." Instead, the Public Accounts Committee could, correctly, have expressed itself in far more definite terms.

The last-cited quotation from the Public Accounts Committee refers to 197.5 million guilders that the government has since written off. We are therefore talking about writeoffs covering a period of more than 30 years. In short, a sum amounting to less than 6 million a year. At the same time these are credits for development costs, which are intended to reduce Fokker's risk somewhat. Such credits are partially discounted --by the government and the Second Chamber-- in the realization that they may eventually not be paid back in full, given the enormous risks involved.

Compared to the aircraft industry in other countries, the subsidization of Fokker is downright low. The Public Accounts Committee can of course object in accountant's terms to the way in which the Ministry of Economic Affairs justified the writeoff in the books. However, whether or not it is desirable to subsidize Fokker does not fall within its area of competence. That is a political question. Of all companies, Fokker is one about which the Second Chamber always has been and still is kept well informed. There is no question of the Chamber's having been asleep at the switch, as some have claimed in the case of RSV.

In its conclusion the Public Accounts Committee says it has "doubts" about Fokker's repayment of some credits that have since been converted into subordinated loans. It says that this assessment is based in part on data supplied by the National Investment Bank. Quite apart from the question of what interest the Public Accounts Committee believes it serves with this publicly-expressed opinion about a private firm, this judgement is not shared by several large commercial banks, since a short time ago they provided Fokker with several hundred million in additional current-account credits.

This does not mean to say that the banks have blind faith in Fokker's future. Nor do MP's and the minister of economic affairs have such faith. Fokker first has to make it to 1992, the year in which sales of the Fokker 50 and the Fokker 100 are supposed to have earned back development costs. According to current prognoses they should do so, as long as the dollar does not fall further, the aircraft-lease market does not collapse, and Fokker is successful in achieving the right production rates for both programs.

The exchange rate of the dollar is beyond Fokker's control. Fokker is, however, investigating the possibility of improving its efficiency in order to lower its costs, while a reduction in labor costs cannot be ruled out. Such a reduction is likely to come from more efficient manning of the production system rather than from a reduction in wages. Relevant here is the poll the Netherlands Trade Unions Federation conducted among its members in cities on the Drecht River about the possibility of working in two or three shifts. The response was generally positive.

Deliveries

Developments in the leasing market are also beyond Fokker's control. However, in its predictions of growth in aircraft leasing Fokker has been considerably more conservative than Guinness Peat Aviation, for instance, the large leasing company. It is up to Fokker itself to achieve the desired production rates and after the initial delays it appears that this need not present any problem. For the Fokker 100 the delivery schedule is roughly as follows: 3 in 1987, 30 in 1988, 32 in 1989, 42 in 1990, and 46 in each of the next 2 years. For the Fokker 50 the figures are: 14 deliveries this year, 38 in 1988, 29 the year after that, and 24 aircraft in each of the next 3 years.

That brings Fokker to 1992, by which time the company will have to have devoted considerable thought to its future course. The question of whether Fokker can continue alone as an independent company has already been answered in the negative by current Chairman of the Board F. Swarttouw. Given the

costs involved in developing new aircraft, that is impossible. Therefore at least one partner will have to be sought.

An important point to be considered in this is the extent to which Fokker can remain independent. The most important factors in that are having its own development and marketing capabilities, along with the production facilities to produce a complete aircraft. Past experience --the failure of the merger with VFW, Boeing's treating Fokker like a child, and the failed cooperation with McDonnell Douglas-- make it clear that finding the right partner will not be easy.

Besides being an independent company with partner(s) and the industrially uninteresting situation of pounding out metal purely on order for others, there is yet another possibility that offers real prospects: Fokker as an integral part of a larger group, but in such a way that production is impossible without Fokker. Fokker has already been talking for some time about the anything-but-easy choice of a future course with the ministers of economic affairs and finance and with the Netherlands Aircraft Development and Space Flight Institute.

12593
CSO: 3698/382

STATUS, GOALS, FUNDING, JOINT VENTURES FOR AUSTRIAN BIOTECH

Duesseldorf VDI NACHRICHTEN in German 27 Mar 87 p 32

[Article by Peter R. Schlifke: Microbes at Work for Austria--Vienna on Biotechnology: Small Is Beautiful--Focal Points Instead of Senseless Race Against Giants Like United States and Japan"]

[Text] Last year, the federal chancellor actually made biotechnoloy the subject of his government policy statement. However, everyday life is characterized not only by interesting research projects and cooperation among companies, but primarily by discussions of subsidies.

The framework was rather unusual: it must have pleased Austria's small guild of biotechnologists all the more that their federal chancellor Dr. Vranitzky chose his government policy statement of 28 Jan of this year to specifically mention their work as one of the areas which would be given particular consideration when it comes to research support.

That is why it was a particularly fortunate coincidence that only one month later an "Information Meeting on Biotechnology and Genetics" had been scheduled in Bad Ischl in Upper Austria which was intended to determine the position of Austrian research in these areas. Approximately 300 scientists from industry and academia had announced their participation to present their current work and to determine priority areas for future research.

Naturally, they also had to worry about money; since the Federal Ministry for Research and Development in Vienna established a seperate support program in 1985, this program alone has funded 28 projects with approximately 60 million schillings (approximately DM 9 million) in the past 2 years. Now the coffers are empty; the funds would run out this year unless sufficient means for basic research are made available as quickly as possible. The President of the Austrian Society for Genetic Engineering, Professor Erhart Wintersberger, Chairman of the Institute for Molecular Biology at the University of Vienna comments: "1987 will be a crucial year for our research. It will be absolutely necessary to provide at least the same amount of funds as previously." Because otherwise Austria could miss its entry into a future market which promises billions.

There is hope: Professor Hans Tuppy, who was appointed minister of science only a few weeks ago and who himself is a world-renowned biochemist, promised the necessary funds--even though it still seems to be unclear where they would come from. Including the funds provided by industry, genetic engineering and biotechnology in Austria would have available a total of approximately 700 million schillings (approximately DM 100 million) for research and development. People in Austria know very well that these relatively modest means will not be sufficient to fully keep up with the "big shots". The Chairman of the Institute for Chemistry at the Agricultural University of Vienna, Professor Leopold Maerz, describes the quality of Austrian research as uneven, but he considers it to be at an international level in some areas. Maerz believes that this makes it particularly necessary to select key areas. It would make no sense for a small country to try to keep up with research giants like the United States or Japan.

In any case, Austria can point to considerable success: the country has extremely well educated researchers, a fact which also led the American company Genentech to establish a new "Research Institute for Molecular Pathology" as a joint venture with Bender Austria in Vienna. This institute will work primarily in cancer research and start operations in 1988. However, Austrians also had to find out that success has its price: they note increasing attempts to hire fully trained researchers away to foreign countries--at salaries which are astronomic by Austrian standards. "Ph.D.'s receive offers which exceed the income of a department chairman. We simply cannot keep up with this," a sorely tested biotechnologist complained. Result: Only approximately 10 percent of the experts required are available, and an improvement cannot be expected until several years from now.

Majority of Projects in Basic Research

Still, the scientists were able to turn the event in Bad Ischl into a performance show parts of which were quite impressive. In addition to the 28 research support program projects already mentioned approximately 100 more research projects were presented. Although the majority of these projects involves basic research, commercial success also seems to be coming for Austria's genetic engineers and biochemists. The Sandoz subsidiary Biochemie Kundl, located in Tyrol, is known abroad; its current sales are approximately 3 billion schillings, and the company can point to strong growth rates.

Now, researchers from the universities are also venturing into the world of business: at the Agricultural University of Vienna a team under the leadership of Professor Uwe Sleytr has developed and patented novel biological "ultrafilters" which will be marketed with the help of venture capital. These ultrafilters are produced by accumulating bacteria on commercially available microfilters. The bacteria form an extremely fine and even pore distribution with high permeability and an extremely homogenous structure. These ultrafilters are intended for use in immunology, the pharmaceutical industry, and in gas separation. Other groups are also negotiating with investors.

Still, it became evident that great efforts will be required to keep up with international development more ore less--even if only in certain areas. One criticism was, for instance, that the area of measuring and control technology

was not sufficiently staffed. The same is true for biopesticides, the physiology of microorganisms, or food technology. More attention will have to be paid to all these areas in the future, if the achievements in basic research--which are quite respectable indeed--are to be translated into economic success. However, this will also require improved cooperation between industry and research.

The conference was also able to score a success with the media. It was in particular a presentation by Professor Max Birnstiel, the Swiss biochemist--incidentally, he is the designated head of the new Institute for Molecular Pathology--that stirred up emotions. Professor Birnstiel reported among other things about studies of base pairs of DNA of so-called mitochondria, small cell particles whose DNA is simpler than that of the cell core and is transmitted only by women. These studies lead to the inevitable conclusion that all humans living today go back to a "primeval mother" who must have lived in Africa. In Prof. Birnstiel's words: "We are all negroes". And this was the lead-in for numerous reports.

12831
CSO: 3698/403

FRG-JAPAN BIOTECHNOLOGY INFORMATION PROJECT BIJANCA

Braunschweig BIOTECHNOLOGIE in German No 3, Mar 1987 pp 5-7

[Article by Dr. Rolf Schmid: "Biotechnology in Japan--National and Corporate Activities"]

[Text]1. A Science Contract Between the FRG and Japan

A "Contract Concerning Collaboration in Science and Technology" between the Federal Republic of Germany and Japan has been in existence since October 1974. It also comprises the exchange of information in biotechnology and medicine. There have been six relevant technical meetings, with participation by about 180 German and Japanese scientists. Primarily research results from both countries in the areas of

- o enzyme technology
- o gene technology
- o cell cultures
- o bioprocess engineering
- o biological waste disposal

were presented.

2. The Acquisition of Information in the Federal Republic and Japan

A glance at the statistical data of both countries exhibits similarities. Thus, both countries are poor in raw materials, but due to their highly developed science and technology, they are major economic powers. Export surpluses are achieved on the basis of importing basic technologies.

Information concerning worldwide market and technology developments thus belong among the vital "raw materials."

The lively need for information on the part of the Japanese expresses itself in the daily editions of the six largest trans-regional dailies with 40 million copies. Not one "picture" paper, but papers of high caliber. With 1.27 copies per household, Japan has the highest reader density in the world. The largest daily and business papers can be consulted on-line for some years. More than 2200 monthly journals with a total of more than 1.8 billion copies (1980)

provide information on the natural sciences, engineering, and the intellectual life.

"In Japan, there is a striving for information."

"In Japan, one can be well-informed."

This is the conclusion of Dr. Rottenberg, the manager of the Tokyo office of the "Society for Information and Documentation", GID.

The Japanese Foreign Trade Ministry MITI clearly invests more heavily in information about the Federal Republic than is the case inversely. The balance is shifted further against us through the voluntary collaboration of the Japanese trading companies. With more than 200 branches and 3000 employees, just in Europe alone, they control worldwide 44 percent of the Japanese exports and 72 percent of the imports (1985).

One difficulty in acquiring information consists in the splintering of modern technology into complicated individual specialties. Thus, the technology committee of the German Embassy in Tokyo has only two staff workers, but they are expected to provide professional trend reports equally about Japanese automobile-, space-, electronics-, and robotics-industry, as well as reports concerning new materials, bioengineering, or gene technology.

On the Japanese side, this problem is solved by forming larger corporate associations. With consultation from responsible employees and with financial support, they sustain their own offices for the acquisition and propagation of information. BIDEC--the "Biotechnology Development Corporation", founded under the management of the MITI (Foreign Trade Ministry) is supported by 175 member firms; the monthly BIDEC newsletter contains everything worth knowing about internal Japanese developments. In addition, it also contains about 100 summaries, translated into Japanese, of Western scientific services and market analyses.

The German information gap is evaluated very differently by different parties. Industry feels "well-informed"--but with some exceptions, one must doubt this evaluation. In the long term there exists a need for information on the part of the BMFT (Federal Ministry for Research and Technology)--especially in view of supporting the international competitiveness of medium and small businesses.

3. Project "BIJANCA"

At the end of 1981, these considerations gave rise to a charge to the BMFT to work out the concept of a data base on "biotechnology in Japan".

Objectives and antecedent conditions

The need for information: What institutions/persons are pursuing biotechnology in Japan? What are the trends? Who is cooperating with whom?

Antecedent conditions: Project management in an honorary capacity, project staff members are part-time, data bases on a PC.

After five years of work, this project could be concluded successfully.

The results are the following:

o A data base with information concerning about 2,500 research sites and about 37,000 Japanese scientists in the area of life sciences (BIJANCA).

o A computer-supported system for the continuous updating of this information (abstract analyzer).

o Publication of this information in the form of a "biotechnology map" of Japan.

o Computer supported evaluation of Japanese biotechnology meetings (JASMEEN).

o Computer supported lexicon of biotechnological technical words in German-Japanese-English, 1986, published commercially (DIJANA).

o Numerous technical publications in German, English, and French.

The system is currently being installed at the Society for Biotechnological Research mbH (GBF) in Braunschweig. Beginning at the end of 1987, it will be available to the public for inquiries. Further project results from past years:

o Annual reports on "Biotechnology in Japan" in English and French for the technical world.

o Printing a biotechnology lexicon with about 6,000 technical terms in German-Japanese-English.

o Preparation of a manual in English concerning "biotechnology in Japan".

4. Biotechnology in Japan--A Survey

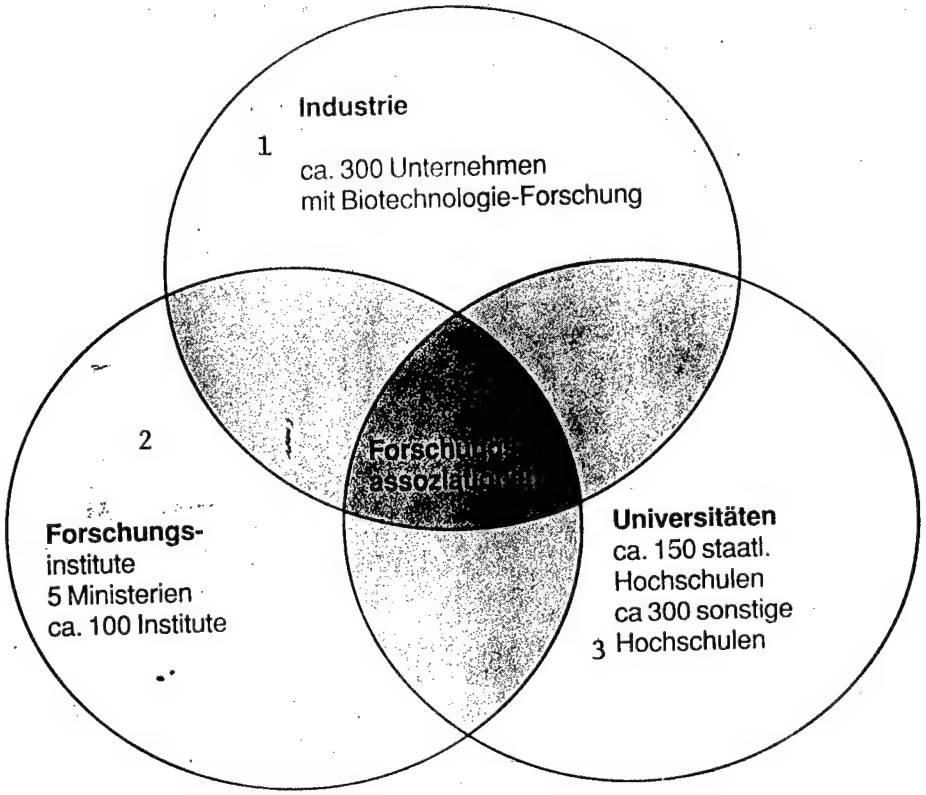
At this time, Japan is earning about 4 percent of its GNP with fermentation techniques. According to an estimate by BIDEC, this will amount to 10 percent by the year 2000 (15 trillion yen, about 200 billion DM).

As has already been successfully tried in other industrial branches (ship and automobile construction, computer technology, new technologies are opened up with a division of labor:

o A ministry furnishes an information base and funding means

o Industrial enterprises form research associations and, where possible, acquire foreign licenses for basic technologies.

Japan's Biotechnology-Research Potential



1 Industry about 300 businesses with biotechnology research
2 Research Institutes five ministries, about 100 institutes
3 Universities about 150 state colleges, about 300 other colleges
4 Research Associations

o Major research institutions and universities work out methodological foundations and examine working risks.

o The Ministry works out approval guidelines and protects the achievement internationally.

o The government encourages the regionalization of production sites.

The onset of a new "industrial generation" is therefore reflected in a concerted increase of personnel and budget. Thus, since 1981, the number of researchers and budgets in the life sciences in corporations, major research facilities, and institutes rose about equally by 50 percent, and in gene technology by 150 percent. In contrast to us, several ministries participate intensively in the development of new industries and actually compete with one another in a certain sense.

Japan--Expenditures and Personnel Deployment in the Life Sciences

	Total	Industry	Institutes	Universities
Research Expenditures (1984, billion yen)	784.1 154 %	370.9 145 %	98.5 175 %	314.7 158%
Expenditures for gene technology (1984, billion yen)	24.7 262 %	13.7 236 %	4.5 375 %	6.5 271%
Research Personnel (1985, persons)	108,802 147 %	27,811 121 %	12,235 156 %	68,756 157 %

Numbers in parentheses: increase compared to 1981 (costs) or with respect to 1982 (personnel).
100 yen = about 1.3 DM
Research personnel: In industry and in institutes, about 50 percent are scientists, at the universities, about 70 percent.

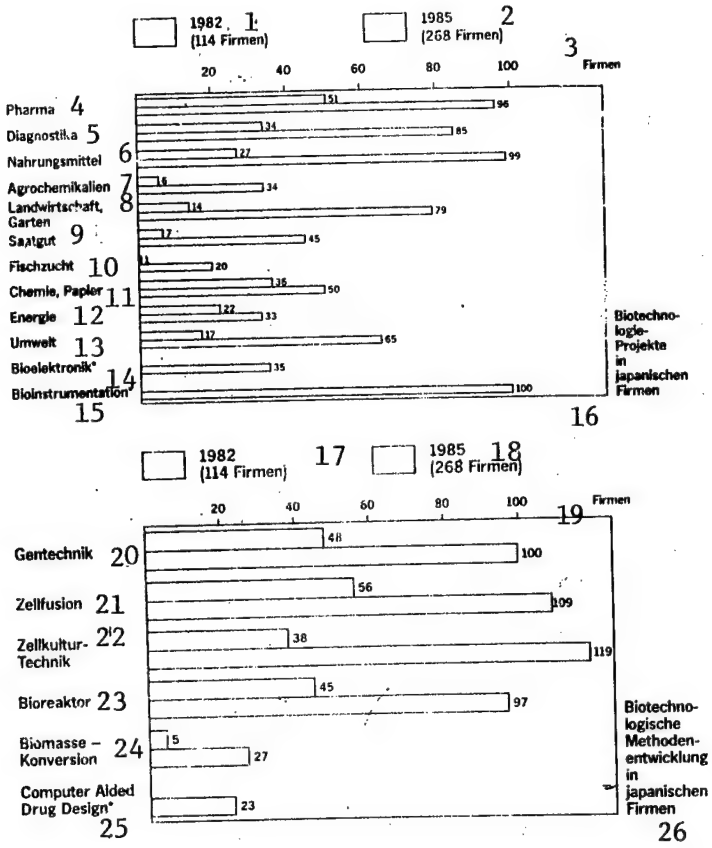
4.1 Industry

Fermentation firms like Ajinomoto and Kyowa Hakko, which are steeped in tradition, have for decades been supplying nearly 50 percent of the world market in individual segments, e.g. with the production of amino acids. About 200 large and medium enterprises in pharmacology, chemistry, and the foodstuff industry have for some years been preparing the buildup of a biotechnology line--or are already in the market.

More than 2000 sake manufacturers, about 1,300 producers of soy sauce, and about 1000 instrument manufacturers--generally small businesses--regard biotechnological methods as an opportunity for conquering new market niches. A remarkable feature here is the readiness for diversification; thus, in the meantime 268 firms from such diverse business areas as pharmaceuticals, seed goods, paper, or energy, have established biotechnological research groups. For all that, the average staff complement is 19.2 staff members. Basic methods have here undergone a stormy development. In the "Biotechnology Development Corporation" BIDAC, called into life by MITI in 1983, 175 industrial enterprises have associated themselves for the following purposes:

- for the joint development of methods
- for the implementation of methods of training measures
- for consultation in the promulgation of legal ordinances
- for the collection of international information.

The great success of this measure has called other ministries into action. Thus, the efforts of the Ministry of Health have just about succeeded in associating 150 pharmaceutical enterprises in an analogous "Biotechnology Development Corporation".



1	1982 114 companies	2	1985 268 companies
3	companies	4	pharmaceutical
5	diagnostics	6	foodstuffs
7	agricultural chemicals	8	agriculture, guidance
9	seed goods	10	fisheries
11	chemistry, paper	12	energy
13	environment	14	bioelectronics
15	bioinstrumentation		
16	biotechnology projects in Japanese firms		
17	1982 114 companies	18	1985 268 companies
19	companies	20	gene technology
21	cell diffusion	22	cell culture technique
23	bioreactor	24	biomass conversion
25	computer-aided drug design		
26	biotechnological development of methods in Japanese companies		

*Not recorded in 1982
Source: Nikkei Biotech. 7 October 1985.

The Agricultural Ministry has gathered 45 enterprises of the foodstuff industry behind its colors. Topic: Biotechnological production of foodstuffs. The Construction Ministry is funding 13 corporations in the development of biological compact waste disposal systems.

In contrast to the Federal Republic, Japan offers a fertile soil for such ministerial initiatives. The following factors contribute to this:

- o a culturally based inclination towards cooperation
- o a readiness on part of many enterprises to diversify into new areas
- o a tradition of long-term earning in business

Some examples ....

1. In 1971, the whiskey giant Suntory invested part of its profits in a biocenter, which belongs among the most sophisticated in Japan. Today Suntory has taken hold in wine cultivation, and has acquired vineyards in California, France, and the Federal Republic. Through the biotechnological development of "virus-free grapes", which can be pressed into more wine of higher quality, Suntory occupies a leading position in international wine research. Some of the gene-technological pharmaceutical research results of the center belong among the top accomplishments world-wide during recent years.

2. When the Japanese mail was privatized in April 1985, six billion yen of the proceeds (about 80 million DM) were applied to the construction of a "protein engineering center". Beginning in 1987, numerous corporations from the pharmaceutical, biological, and computer industry were to interact with one another here. The purpose was to accomplish "computer-supported synthesis of materials". During the next 10 years, this is supposed to lead to new pharmaceutical agents and technical biocatalysts. (The Japan Development Bank is likewise providing six billion yen for this; another six billion are supplied by the corporations themselves. Management: MITI.)

3. The feared minamata disease (mercury poisoning from the consumption of fish from the environment of the soda industry) led to the founding of an industrial association in 1974. Its goal was to convert the 35 Japanese soda factories to environmentally neutral production processes. For this purpose, one billion yen were paid into a fund by the affected firms, another billion yen was paid in by MITI. But the businesses succeeded very quickly in converting their production on their own. Thus, a fund of about 4 billion yen (loans plus interest) was available for new activities. The association--now reinforced by 43 more corporations from the petroleum-, foundry-, electrical-, and chemical-industry, now decided a few months ago to use the funds for building up commercial data bases in the biotechnological area and other advanced technologies.

4. When questioned about the most important tasks of government research funding, 60 percent of the more than 100 questioned corporations replied: "The development of basic methods by means of research associations organized by government". Only 25 percent of the questioned corporations voted for tax measures.

8348
CSO 3698/400

NETHERLANDS: GENETIC ENGINEERING REQUIRES TIGHTER CONTROL

Rijswijk PT/AKTUEEL in Dutch 18 Mar 87 p 3

[Article by Bart Stam: "Genetic Manipulation Requires Better Legal Supervision"]

[Text] The legal regulations for research into recombinant DNA do not include all the biotechnology processes by which genetic information is exchanged between species. These include cell fusion, conjugation (transfer of circular DNA between microorganisms), microinjection, and microencapsulation. The United States and United Kingdom already have legal regulations in these fields. The Netherlands and the European Community are now opting for the same course but no legal measures have been taken so far.

These comments come from Eng J. G. Wessels Boer, speaking for Prof Eng W. C. Reij, director general for environmental hygiene in the Ministry of Housing, Physical Planning, and the Environment, at the Netherlands Biotechnology Congress in Veldhoven. The 2-day symposium was held under the auspices of the ACOB [sic] (Advisory Committee for the Innovation-oriented Research Program--Biotechnology) and the NBV (Netherlands Biotechnology Association). The congress focussed on ecological aspects and applications of biotechnology in the Netherlands as well as on government policy on guidelines, rules, and permits.

"It has frequently been asked recently why regulations were restricted to recombinant DNA," Wessels Boer said. "Is working with pathogenic organisms (those causing disease) not far more dangerous? What distinguishes recombinant DNA technology from other new developments in biotechnology, such as cell fusion and the preparation of monoclonal antibodies?"

After great hesitation about recombinant DNA on the government's part in the 1970's, the situation changed after 1980, Wessels Boer said. "Analyses made it clear that the risks had been overestimated and that effective safety measures were available. After 1980 the government followed the advice of the Committee on Recombinant DNA Activities in preparing risk analyses and guidelines and in assessing recombinant DNA projects of which it was informed voluntarily. A committee was also formed to study the social and ethical aspects of working with genetic material: the broad DNA committee."

In 1985 a majority of the Second Chamber of Parliament agreed that there would have to be legal regulations for DNA research projects: registration at a central point, the possibility to forbid projects or withdraw permission, and a fast response in case of (threatened) disasters. Former Minister Dr P. Winsemius stated later that the Working Conditions and Nuisance Acts would be adequate to deal with the question in the short term until final measures were ready. In the long term matters could be dealt with under the Environmentally-Dangerous Materials Act.

Nuisance Act

As of 1987 the Nuisance Act is the only legal regulation under which recombinant DNA research can be reviewed in advance.

Wessels Boer noted that in the United States and United Kingdom legal regulations no longer are restricted to the "narrow definitions" of recombinant DNA. Wessels Boer therefore wishes to extend the advisory committee's purview to include all organisms in which genetic information is exchanged: cell fusion, conjugation, microinjection, and microencapsulation.

Looking back over the past years, Wessels Boer notes that the discussion about the risks of recombinant DNA have had an effect on other fields of biotechnology as well as on related disciplines such as microbiology, biochemistry, and process technology. The Netherlands Association for Biotechnology and the Directorate General for Environmental Hygiene have jointly worked out guidelines for working with pathogenic microorganisms.

IOP-b [Innovation-oriented Research Program--Biotechnology]

According to Prof Dr R. A. Schilperoort, chairman of the ACB [sic] (Advisory Committee for the Innovation-oriented Research Program--Biotechnology), the IOP-b has developed well to date. He, like Minister of Economic Affairs Dr R. W. de Korte, cited the report issued on Netherlands technology policy by the OECD in Paris. "But," Schilperoort continued, "the ministries involved have used the IOP [Innovation-oriented Research Program] more for industry than for agriculture, the environment, and public health --all sectors for which biotechnology is just as important." The ACB chairman argued that the government as a unit "cannot adequately anticipate in policy terms a broad and deep IOP like biotechnology. It appears as though current circumstances make it practically impossible to carry out a national technology policy. At the present moment the government and the IOP-b appear to be incommensurable quantities."

Prof Schilperoort finds it a matter of concern that the government has no unanimous policy view of the IOP-b. "The continual lack of the resources needed for an overarching program makes it difficult to start new projects in time, given that they have to be completed by 31 May 1990, the date when the ACB is dissolved."

Schilperoort also criticized how the government both makes cuts and stimulates research: "These measures stymie each other, which is a serious threat to a proper research and development infrastructure for biotechnology. Financial

resources are used spasmodically to save what can be saved when uncontrolled cuts create gaps. This problem applies both to the university centers and to the TNO [Netherlands Central Organization for Applied Scientific Research] institutes involved in biotechnology.

Cuts in university salaries and facilities by the Ministry of Education and Science hit talented researchers directly, Schilperoort says. "Understaffing, both at the professorial level and in medium-level staff and doctoral students is the result. One must fear that this will lead to a considerable drop in the level of instruction and research in biotechnology. The Ministry of Education and Science should coordinate its policy better with the technology policy of the Ministry of Economic Affairs."

When the ACB is dissolved in 1990, Netherlands biotechnology must continue to receive support from the government. "After 1990 there will have to be a single organization or committee with sufficient authority and financial resources to push through and keep up to date a national biotechnology program. It will have to be an organization in which both business and the scientific world have confidence. With support from the research and development infrastructure, such a body can serve as a sounding board for the government."

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BELGIUM: 1-BILLION FRANC, 5-YEAR PROGRAM TO BOOST AI R&D

Brussels KNACK in Dutch 1 Apr 87 p 43

[Article by L. W.: "Government Money for AI"; first paragraph is KNACK introduction]

[Text] Minister of Science Policy Guy Verhofstadt has launched a stimulus program in AI. The goal is to develop and strengthen basic research in artificial intelligence.

The program has just started and will run for 5 years. The sum of 1 billion francs has been allocated for it. Guy Verhofstadt has decided to provide fewer direct subsidies for research in industry and more for basic research.

Although Belgium already has some accomplishments to its credit in AI --the seminar "Operate Expert Systems" scheduled for 28-29 April in the SCK in Mol will demonstrate some examples-- it is a fact that all in all AI is just in its infancy. Expert systems, which use data and heuristic rules, are actually still just an embryonic form of artificial intelligence.

Proposals

Dr Marc Luwel, science adviser on Verhofstadt's staff: "Current systems work by trial and error, because imitating human thought processes, human logic, is more difficult than you'd think at first. For instance, it seems obvious that we recognize this rectangular cardboard box here in my hand as a cigarette package but for a machine it's not so evident. Even in such everyday things there are countless thought processes that we aren't even aware of. AI has got to be more than trial and error. We've got to be able to provide contexts for the machine. We understand the written word because we view the sentence as a whole and can deduce from that that this curl here has to be a 'd,' and so on. It takes masses of work to make it possible for a machine to do that."

Current expert systems, however intelligent, are still very primitive. Belgium is relatively weak in AI research because this kind of work only thrives in universities and in the laboratories of large, prosperous businesses. Will we then have to develop our own AI software in a probably hopeless race with the United States, Japan, and even France?

--Marc Luwel: "We know that our market is being flooded with AI from abroad. So we'll have to provide our own industry with it. It's always a bother and a risk to work with black boxes. You mustn't become a slave of imported technology. You've at least got to understand it."

The Ministry of Science Policy has just sent all Belgian universities a list of major issues in AI: vision, speech (mainly voice recognition), natural language processing, heuristic rules study, and knowledge acquisition. [List is in English in original.] Or, for those to whom such un-Dutch specialist jargon gives a stomach ache: teaching machines to recognize objects, to understand speech, to process language, to acquire knowledge. And research in heuristic rules and logic. Research in knowledge acquisition will benefit greatly from the human sciences. Psychologists, educators, etc. can make very useful contributions. The universities are now expected to submit program proposals involving these issues.

Who will evaluate these program proposals? So as not to be both judge and jury, the Ministry of Science Policy will assemble an international group to do that. Each research team selected by this group will receive support for its research in the form of people, equipment, and operating money. Furthermore, there will be a number of related measures. These will aim at making it possible for foreign researchers to do some work in Belgium in an interuniversity context. We know from experience, for instance, that Americans are very willing to come to Belgium for half a year because of its central location in Europe. On the other hand Belgian researchers will have a chance to spend time in foreign laboratories.

The program will be administered by the Ministry of Science Policy's administrative staff and a support committee is to provide the scientific coordination. Which universities will participate depends on the program proposals they submit. And that is the sole criterion, the size of the university playing no role. The letters were sent to the universities in February and the decisions are expected to be made toward June.

Who has been asked to serve on the support committee? Organizations such as the following have been contacted: the Association of Data Processing Organizations in Belgium, Fabrimetal, the NFWO [National Fund for Scientific Research], and the VBO [Union of Belgian Enterprises]. At present it has not been decided who will actually be on the committee.

Does Guy Verhofstadt also expect support from industry for such an exciting project, one from which industry too will be able to enjoy the fruits? Indirectly he does, since these AI programs can be awarded contracts in industry.

--Verhofstadt: "The high-quality research groups in our universities must form the reservoir from which our industry can draw people and ideas."

Is this stimulus program part of ESPRIT or one of the other European initiatives in the computer field? No, but an indirect link with ESPRIT could develop.

--Luwel: "You can only participate if you've got something to offer, if you yourself have high-quality research too."

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JAPANESE FIRM BUYS FINNISH NEURAL NETWORK INVENTION

Helsinki HELSINGIN SANOMAT in Finnish 12 May 87 p 28

[Article: "Japanese Giant Firm Bought the Invention of a Finnish Researcher; Asahi Chemicals Paid Millions of Markkas for the Information"]

[Text] The Japanese conglomerate Asahi Chemicals will start manufacturing speech recognition equipment which is based on the invention of Prof Teuvo Kohonen from Finland

Two years ago the Institute of Technology and the Asahi Chemicals reached an agreement to develop the speech recognition system. For a lump sum the Institute sold the Japanese the computer program, data, and training.

The Institute of Technology will not disclose the amount of money paid by the Asahi company, because it could interfere with the research policy of the institute. Reportedly it is within the range of several millions of markkas.

The Asahi Chemicals is Japan's largest chemical industry enterprise. In recent years Asahi has expanded its activities into the area of data processing.

At the beginning of this year Asahi representatives announced that the speech recognition system would be introduced to the market as early as this year.

According to Kohonen, the sale of the speech recognition system will probably not be started until next year, due to technical delays.

At least initially Asahi will be concentrating on the Japanese markets.

The speech recognition system prototype was completed in 1985, and since then it has been continuously improved.

The Asahi Chemicals had contacted the Institute of Technology as early as December 1984. The Japanese had heard about the Finnish invention at a scientific conference.

The speech recognition system makes it possible to use a computer by merely talking to it. Kohonen's invention can be used to input computer data, to control complex processes, and to monitor the condition of the equipment.

"As long as we were just speaking for ourselves no one listened. When Asahi came along, all of a sudden everyone was interested," Kohonen says.

Following the agreement with the Asahi Chemicals, other companies, such as the Italian Olivetti and the American Digital, have contacted Kohonen.

"The Finnish companies have not even begun to show any interest in my invention. This involves difficult technology, and it requires long experience and education. In Finland there is hardly sufficient capacity for special areas like this," Kohonen says.

Meant for Microcomputer

Kohonen's invention aims at recognizing an unlimited lexicon. Other systems that are being developed try to recognize separate words.

"At the moment the spelling accuracy of the system is over 90 percent of the individual characters. Within a fixed 1000-word lexicon the system recognizes over 97 percent of the words. A capability above this level would clearly cost more, and it would require a supercomputer," says Kohonen.

Kohonen's speech recognition system has been developed to run on the so-called personal microcomputers, which have already been sold by the millions all over the world. The system consists of about five inventions.

"Our research has not focused on the speech recognition system. It was gained as a byproduct of more extensive basic research," Kohonen says.

Kohonen's research focuses on developing technical systems corresponding to the human neural networks.

Kohonen--well known even internationally--currently works as research professor at the Academy of Finland. Ever since the late 1960's he has done research on complex perception and learning systems.

CSO:3698/452

SIEMENS-PHILIPS AIM AT IC LEAD BY 1988-89

Duesseldorf HANDELSBLATT in German 27-28 Mar 87 p 31

[Text] Hannover. All indications are that countries like Taiwan and especially Korea will in the future take over Japan's role as the low-price vendors of electronic components, and will flood the world markets. The Japanese appear to be turning towards still more powerful innovations, and are already aiming at a 300 megabit memory for 1995.

Thus states the representatives of the ZVEI (Central Association of Electrical Industries) Technical Association for Electronic Components, at a press conference in Hannover. The chairman of the Technical Association, manufacturer Friedrich Ruf, pointed out the stagnation of market volume for components in the Federal Republic for 1986, scarcely at the 85 level of 11.3 billion DM, after the market in 1984 grew by 26 percent and in 1985 by 13 percent. Nevertheless, for the coming decade Ruf also considers an average market growth of just about 10 percent per year as realistic. Despite the 1986 breather, the number of employees in this business branch nevertheless increased 6.5 percent, to a current total of 75.700.

The 1986 market is divided as follows, according to the three main categories: active components (tubes and semiconductors including microelectronics) 5 billion DM (minus 5.6 percent), electromechanical components (switches, plug connectors, printed circuits) 4 billion DM (plus 5.6 percent), passive components (resistors, capacitors, inductors) 2.26 billion DM (plus 0.6 percent).

Export and import are specified by the Technical Association at 6.6 and 7.6 billion DM respectively. About three-quarters of the export went into the common market (57 percent fraction) and into the Efta (16 percent), 6.5 percent to the USA (with a 15.6 percent import fraction), only a modest 1.7 percent in Japan, while the Far Eastern competitor represented 17 percent of German imports.

The question, how large is Federal German production, remained completely open in Hannover. If one subtracts imports of 7.6 billion DM from the German market volume of 11.2 billion DM, but adds exports of 6.6 billion DM, one arrives at a calculated production of 10.2 billion DM. According to other statistical sources, however, production is only about 7.5 billion DM. The Technical Association did not see itself able to clarify this mysterious figure of nearly

3 billion. In any case, about 30 percent of the imports are supposed to come from foreign production sites of German firms.

According to the Technical Association, the enormous discrepancy between Germany and Japan is not based on a know-how deficit, but is supposed to be a problem of the minimum market size. But this problem could be blunted by the implementation of a truly common market.

As a problem in the very near future, the Technical Association indicated efforts in the USA, observable for some time now, to insulate a domestic market in terms of product deliveries and production facilities for component manufacturers. The Koreans have been aiming at an annual production of 9 million units color television tubes, with a domestic demand of only 2 million units.

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FRG FEARS KOREA-TAIWAN TAKEOVER OF JAPAN ROLE IN ELECTRONICS

Duesseldorf HANDELSBLATT in German 3-4 Apr 87 p 25

[Text] Duesseldorf. "Europe has a good chance to catch up, even if the leading nations, the USA and Japan, still have a technical lead in the area of microelectronics." Juergen Knorr, general director of Siemens Inc., and manager of the semiconductor area in Munich, thus optimistically defends the enormous efforts of the European electrical enterprises.

In particular Siemens Company dedicates a major portion of its research expenditures to semiconductors because the technology of microelectronics, know-how in production and in process engineering, as well as adequate utilization of information for materials physics are decisive for its competitive position and thus for the success of its products in the world market.

"Microelectronics is among the key technologies which must be mastered if one wants to succeed in the systems business." This is how Dr Bernhard Plettner. chairman of the board of Siemens Inc., classifies the importance of microelectronics.

About 10 semiconductor manufacturers determine the market for integrated circuits (IC). While the conventional electrical world market averaged an annual growth of 6 percent during the last 15 years, and the prognosis for the coming years is only for 2.5 percent growth, the market associated with electronics during the same period grew at an annual rate of 9.5 percent, and an average annual growth of 8.5 percent is expected for the next 5 years. "Despite all the hectic movements," according to Juergen Knorr's estimation of further development, "integrated circuits will continue to enjoy an average growth of 20 percent." (Compare Figure 1.)

During the past years, the production fractions in the electrical industry overall have shifted particularly in favor of Japanese manufacturers (Figure 2). Thus 1985 imports were as follows (relative to the respective domestic production of integrated circuits):

- Western Europe: 180 percent (this is 70 percent of the market),
- USA: 15 percent (this is 18 percent of the market), and
- Japan: 7 percent (this is 9 percent of the market).

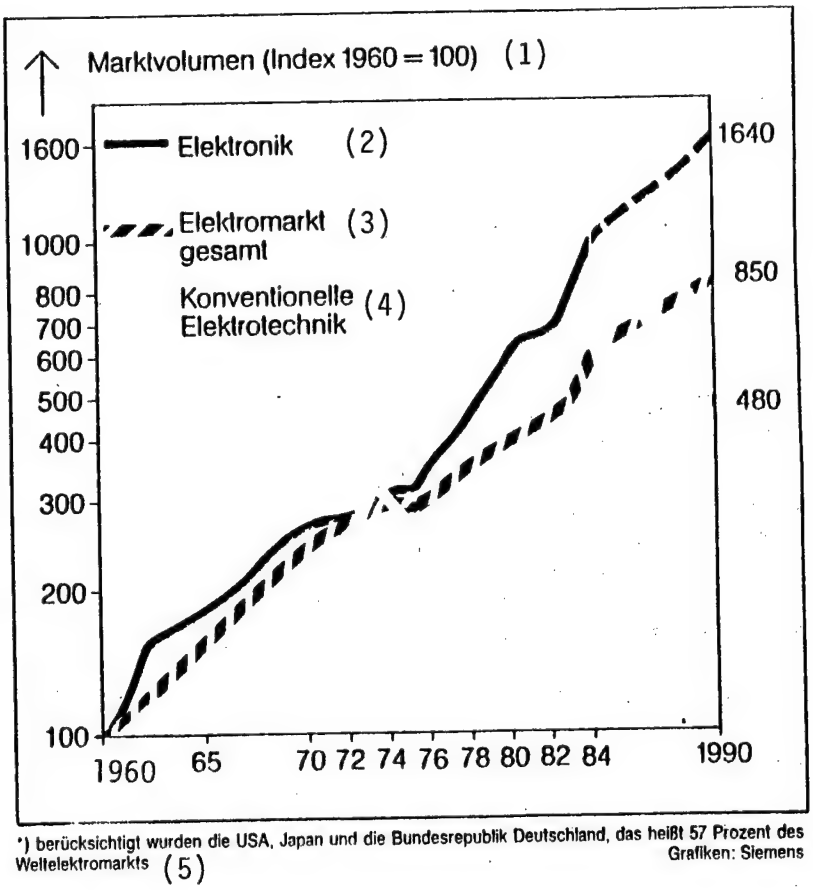

Figure 1: Development of the World Electrical Market from 1960 to 1990*
Key:
1. Market volume (1960 index = 100)
2. Electronics
3. Total electrical market
4. Conventional electrical engineering
5. The USA, Japan, and the Federal Republic of Germany were considered, that is 57 percent of the world electrical market.

Western Europe, with 7.4 billion DM IC imports, is the largest importer, and the USA is the largest exporter. Integrated circuits will occupy a dominating position during the next few years, because their small space requirement, their falling costs and prices per function, their low inherent power requirement, and their high reliability will assure strong growth.

Integrated Circuits as Growth Engine

The market for components is the world market. There are no significant obstacles in supplying customers economically even over large distances. But whoever wishes to survive in this business must be able to persist for the long pull. But progress has its price. New technology generations arise every 3 to 4 years, but finally these must also be financed. Thus, at Siemens, the starting idea is that, independent of boom and bust years, 22 percent of sales

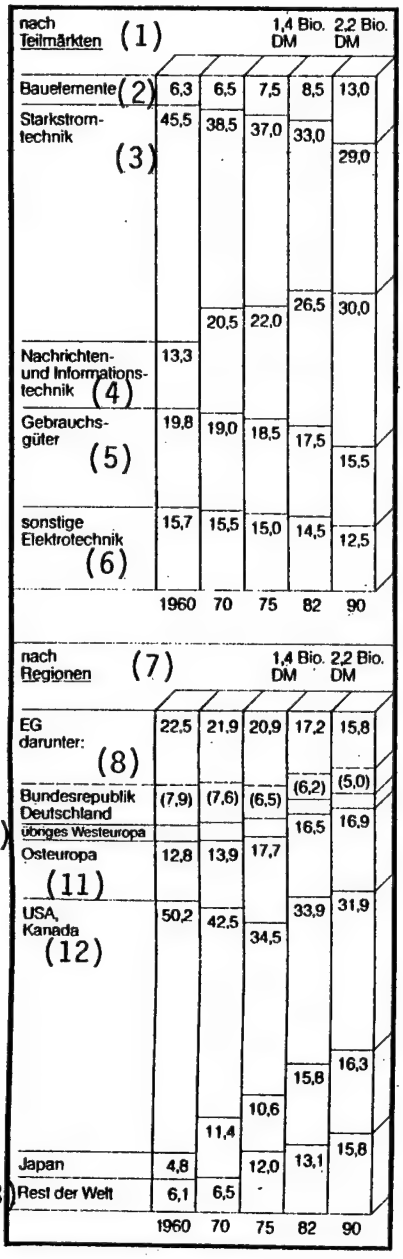

Figure 2: Development of the World Electrical Market (at real 1982 prices in percent)
Key:
1. According to component markets
2. Components
3. High-power technology
4. Communication and information technology
5. Consumer goods
6. Other electrical engineering
7. According to regions
8. Common market including:
9. Federal Republic of Germany
10. The rest of Western Europe
11. Eastern Europe
12. Canada
13. The rest of the world

probably have to be expended for investments in this area, with required average annual sales of more than 2.5 billion DM per enterprise.

Thus it is less the material and wage costs which determine the relevant price but the decision concerning the "running" and "stopping" the manufacturing facilities, whose investment doubles from memory generation to memory generation. A manufacturing module for the 16 kbit memory still costs just about 50 million DM; expenditures for the 256 kbit memory rose to 250 million DM, and for the 1 mbit memory to about 500 million DM. Thus, only those manufacturers will be able to achieve reasonable profits who maintain the

largest production capacity, have access to the market and thus can determine the prices.

Siemens and Philips want to be at the top in 1988/89

Through their cooperation, Philips and Siemens wish to be at the top worldwide, by the latest in 1988/89, in availability of high performance CMOS technology. Here too, the time lead in entering the market will be decisive for economic success. Knorr recognizes that, "Only he can earn back the high preliminary expenditures, who offers his products with the very first competitors."

With the application-specific integrated circuits, the market will develop somewhat differently than with standard components. The technical sophistication and the understanding of IC developers for the critical peculiarities of the final products, which their clients produce, will be determinative of success here. Especially the central European industry, which is stamped by machine construction, but which has begun only late to use electronics, will become an important purchaser of application-specific integrated circuits.

Thus the question can also be answered, why enterprises want to participate at all in this capital-intensive and thus risky competition. A broad spectrum of devices for telecommunications, for data technology, for industrial electronics, and for automotive electronics is a fact forcing this growth. Consequently, a manufacturer of electrotechnical products must participate in this market growth. Indeed, no one needs to manufacture everything himself that goes under the name of microelectronics; however, today one must learn to understand what may be a life necessity for the enterprise. Knorr: "The measure of success of the resultant products is their competitiveness in the world market."

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NETHERLANDS: NEW SCIENCE COUNCIL TO STIMULATE MICROELECTRONICS

Rijswijk PT/AKTUEEL in Dutch 1 Apr 87 p 11

[Article by Bart Stam: "Microelectronics Stimulation Plan Finally Underway after Delays"; first paragraph is PT/AKTUEEL introduction]

[Text] Last week in Delft Minister [of Education and Science] Dr Cand W. J. Deetman installed the scientific council of the Delft Institute for Microelectronics and Submicron Technology (DIMES) as part of the national stimulation program for microelectronics. Despite what the name suggests, this organization's task is to push the national microelectronics stimulation program in all parts of higher and scientific vocational training. After a difficult beginning, the starting gun has finally gone off.

During the symposium held last week at Delft Technical University on the national stimulation program, Prof Dr Eng S. Middelhoek of Delft's Electrical Engineering Faculty, declared that it was wise of policymakers in the Ministries of Education & Science and Economic Affairs to put aside so much money for what are intended to develop into centers of excellence. The term "so much money" refers to the total of 135 million guilders that Minister Deetman and former Minister of Economic Affairs Van Aardenne put aside for this purpose in early 1986. According to Prof Middelhoek, it is also an intelligent move on the part of the government emphatically to involve the higher technical schools in this catch-up effort. The participation of these schools is necessary, quantitatively and qualitatively. The Delft professor added that the three technical universities are not just getting going now. "Things are already happening. In Delft, Eindhoven, and Twente we're already working with CAD equipment." That cannot hide the fact, Middelhoek says, that this country is running behind the curve in the field of microelectronics. "It's typical that Philips had to bring in specialists from abroad for the Megaproject, even though interest in this fundamental technology is increasing enormously among prospective students." Middelhoek looks enviously at large, specialized institutes such as the University of Berkeley [sic], for instance. In Europe the leaders are Stuttgart, Toulouse, Neuchatel, and Louvain. "Once the national stimulation program is going, we'll catch up with Europe in 2 years," says the professor gamely. The 10-person Scientific Council consists of members of the Electrical Engineering and Technical Physics Faculties in Delft, Twente, and Eindhoven; the FOM [Basic Research into Matter] Foundation; the Interuniversity Microelectronics Center [IMEC] in Louvain; Philips'

Physics Laboratory; and ASM Europe in Bilthoven. Prof Middelhoek described this as a select group and one outstandingly well suited for its task of serving as a kind of national scientific center to study, validate, and coordinate the stimulation program. The question, however, is what will happen after 1990. Minister Deetman has already hinted that the teaching and research costs will have to be borne entirely by the universities. "It will be difficult but it has to be done. That is why we want to study whether the program is not eligible for EEC subsidies. ESPRIT and COMETT are possibilities. It is obvious that each university cannot pay for it itself. But we are very hopeful that someday there will be a European Institute for Microelectronics."

Cooperation

According to Minister Deetman the construction of DIMES will lead to the "cooperation I had in mind with other universities, organizations, and companies."

The installation of the DIMES Scientific Council is the latest step in a long, often delayed series of Netherlands measures intended to do something about the possibilities offered by microelectronics. Sceptics assert with the regularity of a metronome that this country is in danger of missing the boat. A few months ago, for instance, Dr W. Dekker, the former chairman of the board of Philips, said that the Eindhoven multinational found it very difficult to attract IC designers for the Megaproject. Philips is now getting specialists from IMEC in Louvain, Belgium. Limousines stand at the door with the motor running, so to speak, to drive these saviors to Eindhoven at a speed that would give cold chills even to Minister [of Transport and Public Works] Smit-Kroes.

Rathenau

According to Minister Deetman the Rathenau Advisory Committee woke the country up with the report it submitted at the end of 1979 on the social consequences of microelectronics. "That was an important milestone that led to numerous initiatives," Deetman said. He cited the Microelectronics Centers (CME's); Delft Technical University's Submicron Technology Center (CST); and the FOM Foundation's semiconductors working group, which has given rise to the NELSIS/ICD very-large-scale integration program for design aids. Deetman also mentioned the Ministry of Economic Affairs' spearhead program in sensors and actuators, which is being carried out by the Technical Sciences Foundation, and the Innovation-oriented Research Program for IC Technology (IOP-IC). According to Deetman all these initiatives have helped get research underway. "The technical universities no longer could guarantee continuity of financing for the microelectronics infrastructure. That infrastructure not only must grow and stay up to date, it must also improve. Not only because of scientific and technological developments but also because of the increasing demand for graduates." The Christian Democratic Appeal minister says that a change has occurred in recent years in the relationship between university planning and government policy. "Whereas earlier it was a matter of setting up separate plans which were aimed in part at chip production, there is now coherence in planning, with the emphasis on research." Deetman also feels it

important that higher technical vocational training is also enjoying the fruits of this now. "These schools can now use the technical universities' knowledge and infrastructure."

Heikes Panel

The government has also been guided by the Heikes Panel, which argued in 1984 for separating chip design and production. The panel pointed out that the demand for chip designers is far greater than that for process technicians. It proposed assigning two specialities to each technical university, as well as providing processing facilities and CAD work stations. Business would have to be responsible for the "hard" processing. The panel further called for cooperation with IMEC in Louvain.

On 15 May 1985, after consulting with Minister Van Aardenne, Deetman was able to inform the various boards of governors that 135 million guilders would be made available for the period 1985-1990 for the microelectronics stimulation plan. Of this sum, the national government would provide 83.2 million guilders. The technical universities themselves would have to come up with 35 million, while 14 million would come from the FOM Foundation for semiconductor technology. The government aid was subject to three conditions: the technical universities themselves would have to contribute 35 million guilders; they would have to cooperate with higher technical vocational training, business, and foreign organizations; after the 1985-1990 period, the technical universities themselves would have to spend at least 30 million guilders on research and development in microelectronics.

On 31 January 1986 Minister Deetman was able to make known the final policy assumptions. "The training of IC designers can only be strengthened if the infrastructure is improved," said the minister. Places for the production of IC's required in instruction will be made available in cooperation with business. In higher technical training, it is necessary for various reasons to work on hardware and software, on developing instructional materials, and on providing refresher courses for all disciplines involved. Cooperation between higher vocational training and the technical universities is a prerequisite for all this.

Minister Deetman states that the stimulation program must play to the technical universities' strong points. In Delft that means research and development in the Electrical Engineering Faculty's IC workshop and the Technical Physics Faculty's Submicron Technology Center. Twente Technical University will focus on sensors and actuators. Eindhoven will emphasize research in III-V combinations and in optoelectronics. To ensure that the three technical universities adhere to this plan even after 1990, Minister Deetman and the Ministry of Economic Affairs have established the Steenbergen Evaluation Committee.

PICO Project

A source of concern for government, universities, and business alike is training for IC designers, both at the higher technical schools and the technical universities. The major issues here are keeping abreast of

international developments and standardization. The 20 Netherlands higher technical schools offering electrical engineering are to play an important role in what is known as the PICO project, which stands for Plan for Training IC Designers. Chairman of the steering group is Eng L. J. Tummers. The PICO project officially started on 1 January 1987. The sum of 30 million guilders has been made available for it. Tummers says that the technical universities will have to act rather like missionaries. "They will have to pour their knowledge about IC design into those higher technical schools." Delft, Twente, and Eindhoven will each be assigned a kind of geographic hinterland and the electrical engineering higher technical schools in the area around these technical universities will cooperate intensively with the appropriate faculties. Tummers said it was a source of pleasure that some higher technical schools have gotten the jump on the national stimulation program and are already hard at work training IC designers. These schools have been baptized "spearhead higher technical schools." Alkmaar, The Hague, Eindhoven, and Enschede are receiving extra money for personnel and equipment. "Apollo Computer BV is providing the work stations, four for the spearhead higher technical schools and three for other training institutions. To create a linkage between scientific and higher vocational training, the technical universities are each getting eight work stations.

Tummers has high hopes for what he himself calls the "harvest": "By 1990 we want to have 1,400 higher technical school graduates annually who have been involved in IC design in their studies." That will not be an unnecessary luxury since there are now 2,500 electronics companies of all sizes in this country. Turning to what will happen next with PICO, he says that "it is important for business to make more and better IC-design training positions available." Furthermore, the government must adhere to the finance timetable. "A month's delay means lagging behind for years." What will happen after 1990 is still entirely unclear, says Tummers. The higher technical schools have no money. That is why he wants to get firm guarantees for the 1990's as soon as possible.

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NETHERLANDS: UNIFIED COLLABORATION AGAINST FAR EAST COMPETITION

Rijswijk PT/AKTUEEL in Dutch 4 Mar 87 p 4

[Article by Mala Janki: "Microelectronics-- Our Fight Against the Four Eastern Tigers"]

[Text] Japanese is still the order of the day. Whether the topic is consumer or industrial electronics. This was clear yet once more at the SCME-Fiarex Congress "Microelectronics, More and More a Must" held last week in Amsterdam. Japanese firms, followed by Korea, Taiwan, and Hong Kong, dominated all sectors, from doing market studies to organizing sales worldwide.

In his address "Microelectronics Applications: a Marathon, Not a Sprint," Eng H. J. Bosch, manager of the Microelectronics Centers Foundation (SCME), pointed out the need for Europe to combine its forces. In the field of consumer electronics the United States and Europe are practically nowhere. As a manufacturer of compact disk equipment, for instance, Philips is up against no fewer than 19 Japanese brands.

A poignant example in business electronics: the Megaproject of Philips and Siemens has to measure up against Toshiba, Fujitsu, Hitachi, Mitsubishi, NEC, Sony, and Sharp. Korea is involved too: Samsung electronics is about to start deliveries of a 1 Mb DRAM.

"Keeping up is not enough; moving ahead and advanced thinking and acting must be the source of strength for the modern high-technology firm. Applying microelectronics is a question of creativity and stamina in a technological world that is in constant movement and will result in thinking in terms of systems. Consequently the SCME's main task is to make Netherlands firms aware of applications of microelectronics in all its aspects, now and in the future," Bosch said.

Biosensors

Japan also leads in the introduction of new technologies. Biosensors are an example. These are used to measure such things as temperature, pressure, or the concentration of a substance in a biochemical process or system, which can range from river water to the human blood stream. Although the importance of these sensors is acknowledged worldwide, it is once again Japan that is in the

lead. Japan's Ministry of International Trade and Industry has allocated 2 billion yen (about 27 million guilders) for biosensor research over 5 years. The Netherlands has earmarked roughly 0.6 million guilders for a 2-year stimulation project in biosensors. The pattern of expenditure in the countries around us is in the same order of magnitude. Even though interest is high, Europe lags behind.

Dr Cand D. Sprangers, project leader for biosensors at the Twente Microelectronics Center, noted at the congress where the Netherlands' difficulties lie. "There are clear problems with looking at research one-sidedly from the standpoint of this speciality or that and in the passage from laboratory prototype to industrial product development. There is sufficient knowledge and interest in developing and applying biosensors in the Netherlands but the research is still too disjointed." Indicative in this connection is the remark of a Japanese visitor during an orientation: "Where you in the West have one project per country, we in Japan have one such project per company."

Custom Chips

Nor do prospects look rosy for Europe in the market for custom chips, chips made to measure. Besides competition from the United States, the Far East has its claws out here too. The Americans' success comes primarily in computerizing chip design. Japan is making great progress in process technology, managing to create greater and greater densities on a given chip surface. Companies like NEC, Toshiba, Oki, Sanyo, Mitsubishi, and Matsushita are winning an important portion of the American and European markets. Because of economic and technical developments in the United States and Japan, European industry can no longer make sufficient profits to invest in research and development. This leads to constant postponement in applying new custom chips in their products, so the lag grows.

Catching Up

Speakers at the congress put heavy emphasis on government stimulation, effective knowledge transfer, uniformity in testing and security demands, and standardization in Europe. In addition, subsidy regulations should be made simpler and handled more quickly. The European subsidy programs like ESPRIT and EUREKA turn out to be only of limited value. The administrative thresholds are still much too high for smaller firms. Larger firms should make access to their knowledge easier for smaller ones. Only if these conditions are met can Europe defend itself against the looming Japanese technological domination.

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R&D FACILITIES OF NETHERLANDS PHILIPS

Paris CPE BULLETIN in French Jan 87 pp 73-78

[Article by Marcel Bayen under the "Reports and Summaries" rubric: "Research and Development in the Philips Group"; article is based on a note with the same title by Gerard Siclet of the Scientific Service of the French Embassy in the Netherlands]

[Text] The Philips group spends 7 percent of its revenues on R&D. Both basic research and what they consider "strategic" research are centralized in the Netherlands at the Eindhoven laboratories, which employ 2,000 researchers, engineers, and technicians. Its foreign laboratories, located in the UK, France, the FRG, Belgium, and the United States, also employ 2,000.

The various manufacturing departments set aside 1.5 percent of their revenues for financing basic research. In addition, Philips has adopted a systematic policy for turnover of its researcher staff through internal mobility. Thus, every year about 10 percent of its basic researchers are transferred to development, production, or technical marketing departments.

Main Research Centers

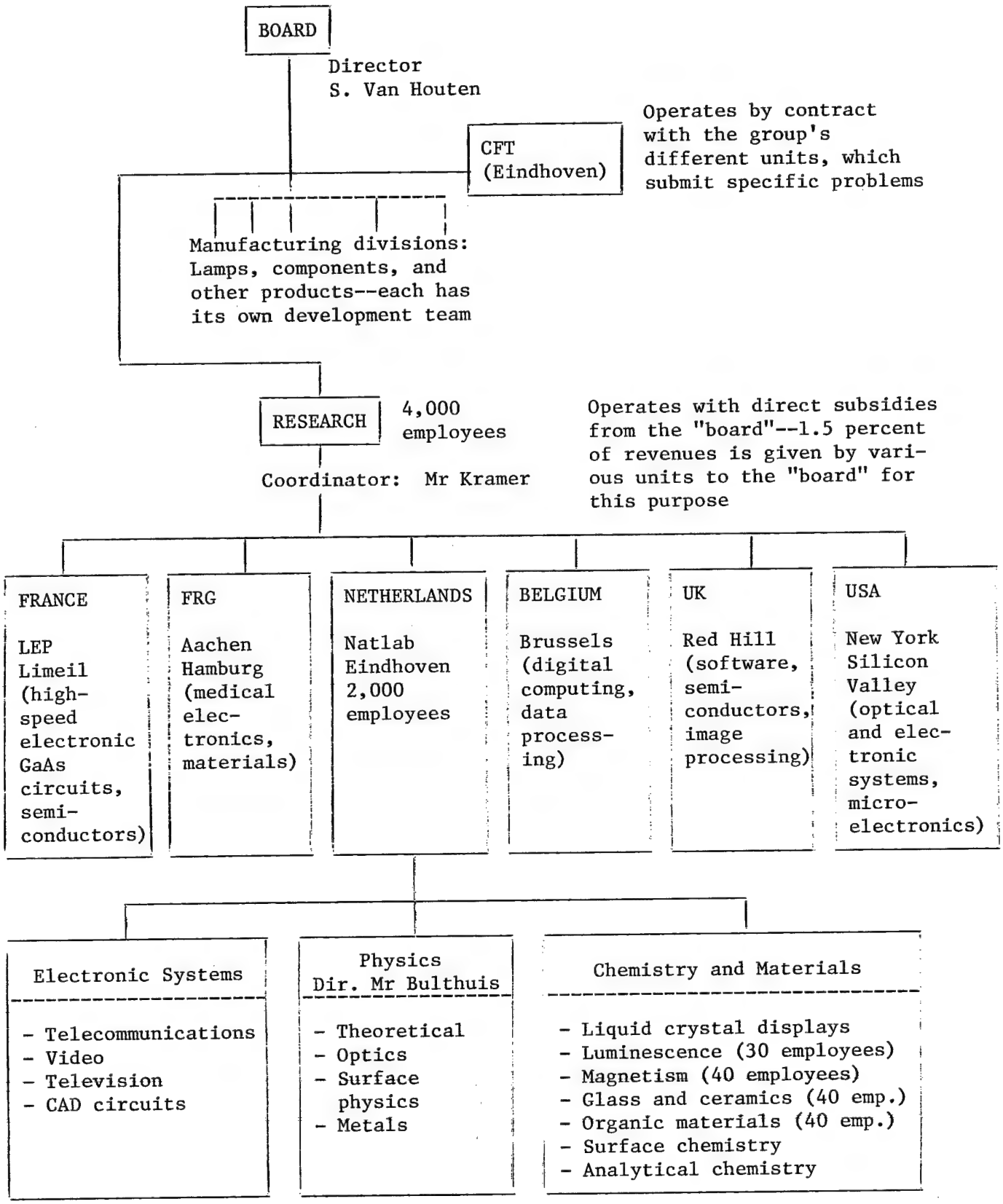
1. In the Netherlands

Natlab

The Eindhoven physics laboratory (Natlab) plays a major role due to both its size (2,000 employees) and its areas of interest. In fact, in addition to its own programs, it is responsible for monitoring all research conducted by the group's various foreign laboratories. Its work is complemented by that of the Center for Manufacturing Technology (CFT), also located in Eindhoven, which has specific responsibility for production methods.

Natlab coordinates research on systems (telecommunications, video, television, circuit design), solid-state physics (basic research on surfaces, optics, and integrated circuits, including especially the Philips-Siemens "Megaproject" for the design and production of a 1-megabit chip by 1988), chemistry, and materials (glass, ceramics, metals, organic materials, and magnetic materials).

Table 1. Research Organization Within the Philips Group



The CFT (Center for Manufacturing Technology)

Operating with an annual budget of around Fr 200 million, some 70 percent of which comes from manufacturing divisions, this center studies miniaturization, reliability, and flexibility of production systems.

CFT's primary fields of activity are: basic technologies (mechanical engineering and electromechanics, chemical and physical technology), manufacturing technologies, and engineering activities (specifically electronic automation studies, image processing, and the development of measuring instruments and machines to manufacture printed circuits).

Philips Medical System

This unit of the Philips group deserves special mention due to its remarkable growth rate. Its yearly turnover has increased 25 percent per year for the past 3 years and is now over Fr 7 billion. Located in Best, near Eindhoven, this unit carries out research in nuclear magnetic resonance together with the LEP laboratories in France.

2. Abroad

--In the United States

Briar Cliff Manor Laboratory (New York)

This laboratory employs 200 people and is oriented toward materials physics, microelectronics, materials characterization, high-definition television, mechanical systems, and data processing.

Sunnyvale Laboratory in Silicon Valley

Owned by the Signetics subsidiary, this laboratory works on integrated circuit technology and design.

--In the FRG

Eight hundred people are employed in the Aachen and Hamburg centers, where work is done on the following subjects: office automation and imaging for medical diagnosis (Hamburg), light sources, vapor phase chemical deposits, materials technology, and electric motors (Aachen).

--In the UK

The Red Hill laboratory, near London, has 560 employees who work on discrete semiconductors, UHF systems, and AI.

--In Belgium

The Brussels laboratory employs 50 researchers in the fields of applied mathematics and software.

--In France

The Electronics and Applied Physics Laboratory (LEP) in Limeil-Brevannes, near Paris, has 400 employees and works in integrated circuit technology, signal processing, and microprocessor and VLSI circuit architectures.

Involvement in Community Programs

Philips is involved in some 50 Community projects. Within that framework, 160 of the group's researchers are presently working with 450 researchers from other European companies and organizations.

The ESPRIT Program (European Strategic Program for R&D in Information Technologies)

Philips is involved with 32 of the total of 155 projects. The Philips research centers are the project leaders in microelectronics, systems study, and automated manufacturing software development projects.

Table 2. Philips Participation in the ESPRIT Program: Phases I (1984-1987) and II (1987-1992)

	Number of projects		Participating Philips laboratories		Total budget (million ECU's)		Philips involvement	
	Phase		Phase		Phase		Phase	
Fields	I	II	I	II	I	II	I	II
1. Micro-electronics	4	7	Natlab RTC LEP	LEP ISA Natlab Valvo Red Hill	59.4	51.4	30.2	10.4
2. Software engineering	2	2	APT PRLB TRT	Natlab PMA	25.9	12.2	7.6	3.7
3. Advanced information processing	3	1	Natlab PMA ISA	ISA	49.0	4.9	16.0	1.0
4. Office systems	4	3	PFH Natlab TDS	LASERV. TRT TKD	50.1	11.5	9.0	3.1
5. CIM	2	4	PMA Natlab	ISA PFH PMA APT	6.4	51.0	1.2	7.8
Total	15	17			190.8	131.0	64.0	26.0*

*(including 14 from the EEC)

The BRITE Program (Basic Research on Industrial Technologies in Europe)

Six of the group's projects have been approved for the first phase of the BRITE program.

Table 3. Philips Participation in BRITE's First Phase

Fields	Number of projects	Participating Philips laboratories	Total budget	Philips involvement (million ECU's)
Reliability	3	CFT Natlab Muller	5.5	1.5
Laser technology	1	CFT	2.3	
New control methods	1	Natlab	2.7	1.3
Polymers, composites, new materials, powder metallurgy	1	Natlab	0.8	0.5
Total	6		11.3	3.3

The RACE Program (R&D in Advanced Communications Technologies for Europe)

Philips-APT is involved in 13 of the 83 projects proposed for the definition phase of RACE.

Table 4. Philips Participation in the RACE Program

Fields	Number of projects	Participating Philips laboratories	Total budget	Philips involvement (million ECU's)
Terminal environment	2	TKD TDS Valvo APT (n) HIS Radiotechn. Cons. El.	7.2	0.8
High-performance integrated circuits	2	RTC TKD APT (n) Natlab LEP	3.8	1.7

[Table continued on following page]

Fields	Number of projects	Participating Philips laboratories	Total budget	Philips involvement (million ECU's)
Integrated opto-electronics	1	RTC APT (n) Elcoma	2.0	0.8
Broadband communications	1	TRT	1.7	0.3
Technological options for long-distance communications	1	Natlab	0.9	0.4
Telecommunications software	1	APT (b) PRLB TKD	0.6	0.4
Terminal technology	2	Red Hill	2.0	0.5
Total	10		18.2	4.9

The EURAM Project (European Research on Advanced Materials)

Philips is interested in this program and hopes to include three topics: laser radiation-induced properties and chemical vapor deposition by laser, battery and accumulator materials and high-speed ion conductors, and hetero-epitaxy.

The EUREKA Program

Several Philips-initiated projects were approved by the Netherlands authorities and presented at the June 1986 conference in London.

Philips is involved in the following eight projects:

--Transpolis: integrated management information system for industrial zones,
--high-definition television,
--a European medical information system,
--Hospital 2000: a collection of new operating room technologies,
--Eurotrans: highway transport guidance system,
--Carin: automobile information and guidance system,
--Eurolaser,
--ES2 [European Silicon Structure]: design and automatic manufacture of integrated circuits.

This document can be obtained from:

Ministere des Affaires Etrangeres
Direction de la Cooperation Scientifique et Technique (DCST)
34-36 rue La Perouse--75775 Cedex 16
Phone: (1) 45-02-14-23, ext. 49-43

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EUREKA CRITERIA, PROCEDURES IN NETHERLANDS EXPLAINED

The Hague EUREKA: MEERWAARDE VOOR EUROPESE BEDRIJVEN in Dutch Date Unspecified pp 7-10, 14-18

[Sections 3 and 6 complete from brochure "EUREKA: Added Value for European Companies," published by the Netherlands EUREKA Secretariat in The Hague, 18 pages]

[Text] [Section] 3. EUREKA Projects: Leading Edge Technologies with Market Potential

In late 1985 the numerous Netherlands responses to the establishment of EUREKA were submitted to initial analysis. In this phase Netherlands companies were already acting either as project initiators or as participants. Since the 1986 Ministerial Conference in London, a number of Netherlands initiatives have been submitted in the following areas: medical technology, agriculture, transportation, logistics, and distribution.

The EUREKA secretariat has now access to a database containing information on the Netherlands companies interested in participating in EUREKA projects.

Mentioned below are some examples of current EUREKA projects which, although still in the definition and feasibility study phase, will include Netherlands companies.

In the agricultural sector:

European agriculture is facing the dilemma of excess domestic production while large-scale exports could have disastrous effects on agricultural developments in the Third World. Solutions are sought in developing other processing techniques aimed at the non-food sector and at improving crop utility at stable production levels.

- The Netherlands Vicon company initiated the Crop Management Expert Systems project. It is developing computer software for agrarian planning systems together with the British Comput-a-Crop company. Accurate planning of sowing, planting, and harvesting could reduce risks. Following the definition and development stages, this project should be ready for implementation by 1988.

In medical technology:

The European population is aging while hospital staffs are being reduced. As medical science is becoming increasingly complex, the quality of medical decision-making should be improved through the aid of computer systems. To maximize the use of the many new (computerized) hospital services scheduled for the year 2000, a global EUREKA project called Hospital 2000 has been initiated to develop a standard infrastructure allowing hospitals to have readily available and exchange information in a rapid and convenient way.

- Part of this program is the Operating Room 1990 project, an initiative of Honeywell Medical Electronics (Netherlands), Draegerwerk, and B. Braun Melsungen (FRG). This project aims at establishing a coordinated plan for the development of a public health infrastructure which clearly delineates the (new) services hospitals will provide by the year 2000. The goal is to reduce risks and to improve the quality of vital decisions by medical staffs.

In logistics and transportation:

Monitoring the flow of goods from producer to end user, with transportation being the major cost factor, is becoming increasingly complex and requires planning and organization. Savings in this sector increase profits in almost any other sector.

- Within the EUREKA framework an inpressive series of logistics projects is being studied. Two of those projects are Transpolis and Transpotel, both initiated by Philips, Wilma, the PTT [Post, Telegraph, and Telephone] and Sijthoff Pers (Netherlands), in cooperation with British, German, and French companies. Transpolis will be the distribution center of the future with integrated data and communications systems both for production and transportation. Transpotel seeks to develop an international cost-reducing communications systems for truck drivers.

In audiovisual electronics:

In Europe different television broadcasting standards are still being used (PAL [Phase Alternative Line] and SECAM [Sequential Memory Color System]), which have moreover reached the limit of their possibilities: they cannot improve sound or image quality. The introduction of an entirely new standard entails the danger that all equipment (both transmitters and receivers) will become useless overnight. The system currently being developed in Japan, for example, could produce such a giant electronic scrapheap.

- The High Definition Television System project is a joint initiative of Philips (Netherlands), Bosch (FRG), Thomson (France), and Thorn EMI (UK). Within EUREKA these concerns are working on a new quality standard which can be introduced gradually. This so-called MAC standard can probably be introduced in a evolutionary way starting in the 1990's by adapting existing equipment. By digitizing electronics, using existing channels, and without drastically changing the receiving equipment, HDTV is the answer to the Japanese system.

Furthermore, several project applications are being examined, many of which have been initiated by small and medium-sized companies. Mobidick, the development of an intelligent bidirectional system for computer translations, has been submitted by Van Dale Lexicografie. This rather small firm will probably continue this project with Le Robert, Philips, and ALPS as EUREKA partners.

Stork X-cel BV, too, has submitted a project called Ink Jet Printing, a non-impact computer-controlled printing technique which can revolutionize efficiency in graphics. The other initiators are Proll and AEG (FRG). Lund University, Perstorp and Tarkett (Sweden), and Gutenbergshus (Denmark).

[Section] 6. EUREKA Procedures: Clear and Simple

The EUREKA Secretariat in The Hague is responsible for inventorying and processing the project proposals submitted by companies or other bodies. After the interested organizations have examined the possibilities for European cooperation within EUREKA, a simple and clear procedure is started leading to the acquisition of "EUREKA status."

These procedures guarantee equal treatment and they also enable the business community to make the best use of government expertise. If necessary, clear procedures also make it possible to provide policy makers (the interministerial EUREKA Steering Group and the Second Chamber of Parliament with up-to-date information at any stage of the project application.

From its beginning in a company until its final approval by the Ministerial Conference, a project proposal has to go through three stages: submission to the national EUREKA Secretariat, official announcement to the international EUREKA organization, and the actual execution of the approved project.

The phases a project has to pass through have been developed as follows.

First phase:

Submission to the national EUREKA Secretariat, including the preparatory (mediatory) activities by the Secretariat's staff.

1. Submission: A company expresses its interest to the EUREKA Secretariat, either with a project proposal of its own (as project "initiator") or with a concrete plan to participate in the project of a third party.

2. Format: To ensure a clear, internationally exchangeable registration, the company is asked to fill out a standard form. This so-called "Format" provides room for relevant information on the company and the potential project.

3. Reference to a specialist department: The EUREKA Secretariat refers the application to the government department most closely involved with either the company or the project. This opens the door to specialist government know-how.

Preselection: The national EUREKA Secretariat makes a first selection among the candidate companies and projects. It examines their feasibility on the basis of a few overall and formal criteria. The applicant is informed of the result of this selection in writing; this result can be:

- The company or project does not meet the overall criteria. If possible the company is referred to others able to continue working with the company or the project.

- The company possibly qualifies for participation in third-party projects. Through the format the company is introduced to similar organizations in other participating countries. Through the Netherlands EUREKA Secretariat the company is approached about participating in a project.

- The company or project meets the general criteria and qualifies for further examination by the Netherlands EUREKA Secretariat.

The government department involved is informed of the results of this pre-selection.

5. Mediation: The Secretariat seeks contact with other companies, institutions, or government departments at home or abroad to promote projects considered promising. This obviously takes place in close consultation with the project applicant(s). A successful "project formation" is required and increases the chances of acquiring EUREKA status since the final decision will be taken only after deliberation with one Netherlands and at least one foreign government department. After successful formation, the project proposal is officially recommended to receive EUREKA status and is circulated among the national secretariats for at least 45 days to allow interested companies to join in.

Second Phase

This phase includes the official announcement and approval procedures as established by the international Ministerial Conference.

1. Netherlands procedure: The national EUREKA Secretariat submits a number of project proposals to the interministerial EUREKA Steering Group. This Steering Group is the highest national advisory body. It advises the minister as to which Netherlands projects can be submitted to EUREKA.

2. European procedure: The list of projects drawn up by the Netherlands Steering Group is presented to the 6-monthly Ministerial Conference, which decides which projects will be given EUREKA status. During this meeting, informal commitments are officially confirmed, thus defining and expanding the EUREKA program at the European level.

Third Phase

As soon as a particular project has officially received EUREKA status from the Ministerial Conference, it can begin. The third phase involves the actual execution of approved projects.

1. Contract: A final contract states the intentions, rights, and obligations of the parties involved. These parties can be two or more companies or other institutions or governments (which can serve as participants or financers). In most cases this contract will already have been negotiated during the "project formation" stage.

2. Project Secretariat: In addition, the participants set up a Project Secretariat which keeps track of the project's progress and handles communications between participants.

3. Project responsibility: The final contract also states the way in which the parties involved will keep each other informed and how they will account for the project's progress. A cofinancing government will of course demand adequate project responsibility and control.

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DUTCH ENGINEERING ASSOCIATION PROPOSES TECHNOLOGY POLICY

Rijswijk PT/AKTUEEL in Dutch 25 Mar 87 p 5

[Article: "Royal Institute of Engineers Offers Its Services in Carrying out Technology Policy"]

[Text] Five weeks before the Dekker Committee is due to present its final report on Netherlands technology policy to Minister of Economic Affairs Dr R. W. de Korte, the Royal Institute of Engineers (KIVI) has offered its services in carrying out that technology policy. According to the president of KIVI, Eng W. J. Wolff, his association has sufficient knowledge and experience to help organize higher technical training and coordinate it with professional practice. The KIVI board wrote the letter to the Dekker Committee on its own initiative.

According to Wolff KIVI does not presume to get involved in the substantive aspects of technology policy in the Netherlands. The main reason for this is that the association's 17,000 members are employed in all sectors of society: government institutions, multinationals, and small firms, universities and research institutes. The interests of these sectors are too varied for the association to speak with a single voice about technology policy. The Netherlands Forum for Technology and Science is probably better suited to take a general position on controversial questions, according to the board.

Carrying out Policy

Whatever form the Dekker Committee's final report takes, KIVI will be pleased to help carry out that technology policy. KIVI, Wolff says, is in a good position to carry out technology policy in practice and to expand on it and refine it. What KIVI has in mind is to create an organization, to make knowledge available, and to coordinate technical training with professional practice.

In a special annex to its letter to the Dekker Committee, KIVI refers the committee to current KIVI activities which may help in this connection: it speaks for professional practice in consultations about training programs with the technical universities and the Ministry of Education and Science; evaluates conditional financing of university scientific-technical research programs; is involved in postgraduate technical training; and participates in

the projects "Cooperation Between Universities, Business and Large Research Institutions," "Personal Computer Use by Engineers," and "Practical Stimulation of Innovation Management in Medium-sized Firms."

Good Idea

The KIVI president says that his association has gained a good idea of the nature and quality of this country's scientific-technical research through evaluating research projects in institutions of scientific education. Because KIVI has teams of experts in various specialities, Wolff says that it, in cooperation with the Foundation for the Technical Sciences (STW), is in a position to evaluate projects involving the future. Wolff cites the project "Practical Stimulation of Innovation Management in Medium-sized Firms" as a good example.

Wolff also says that KIVI is very much involved in retraining and refresher courses for engineers as part of postgraduate technical training. "Adjusting knowledge and skills to fit professional practice is a great challenge, which the Training Council is meeting with new initiatives such as the engineers courses for personal computer use."

The president also cites the engineering association's participation in the European Community's COMETT (Community Program on Cooperation Regarding Training in the Field of Technology) program. "That illustrates the importance we attribute to the necessary interaction between training and practice. KIVI also believes that international agreements on training and the quality of training are very important." The KIVI board believes that it is necessary for technical training programs to be well coordinated if the maximum number of people are to be well informed about technology and technology policy. According to President Wolff, KIVI is very concerned about technical expertise in this country. "Changes in the goals of technical primary education and the attenuation of the apprentice system present obstacles to the smooth transfer of knowledge."

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ITALIAN PROSPECTS IN KEY TECHNOLOGIES EXAMINED

Milan BUSINESS in Italian No 4, Apr 87 pp 80-85

[Article by Riccardo Romani: "The Research Scenario Toward the Year 2000"]

[Excerpts] Space, new materials, biotechnology, telecommunications, third-generation robotics, fine chemistry, microelectronics, data processing, nuclear fusion--these are only some of the key sectors of the new technological frontiers, the areas in which governments and scientific communities, research companies and advanced industries throughout the world already are battling, with varying degrees of commitment, resources, strategies, and objectives.

Unfortunately, it cannot be said that Italy is starting from a position of strength. There are a number of reasons for this: a lack of wholehearted commitment to the innovative process on the part of the entire system (schools, families, companies, public administration, and government); the fact that investments made so far in research and development have been substantially lower proportionately (1.4 percent of GNP) than those made by the most highly advanced nations; and for more general basic reasons concerning the fact that it is no longer possible to be successful in these areas unless the human and financial resources employed in the strategic development choices of these technologies are made within a continental framework.

But things are changing in Italy, both in the approach adopted by government in recent years to these problems, and in the dynamic nature of the sturdy islands existing in certain research areas in our country whose leading edge technologies are by no means inferior to those of other highly industrialized nations.

Robotics

For example, this is true of robotics, a sector that has produced truly outstanding results in a number of areas. As Pierluigi Streparava, president of UCIMU (Italian Association of Machine Tool Manufacturers) says: "Italian production in this sector has an excellent international status and, in fact, ranks No 5 in the world in the production and export of manufacturing technologies. Users throughout the world have a high regard for Italian products for factory integration (with production cycles incorporating

elements from the most advanced mechanical, electronic, and data processing technologies), and for factory automation (which, as a result of integration, makes unsupervised operation possible)."

[This is] one objective on which the leading companies in the sector (Comau, Elsag, DEA, and others) are now concentrating their efforts, since international competition means that the hardware and software technologies they use have to evolve constantly. New companies are being established (eight in 1986 alone) in increasingly sophisticated areas. Just one example of this is Tecnospazio, a company created as a joint venture between Comau (Fiat Group) and Fiar, a company operating in the aerospace electronics sector. Tecnospazio is involved in the study and construction of extravehicular robots intended for use outside the space shuttle or for the planned orbiting space stations. This is the furthest tip of a sector which, in the field of advanced factory automation, can already boast of utilization by leading companies at a national and international level (Fiat, General Motors, Rockwell, General Electric, Chrysler, Volkswagen, Volvo, and others). Moreover, this sector is gradually spreading throughout the Italian industrial fabric, in the double form of secondary suppliers and applications consultants dealing with a new type of robotics, that is, the applications required by the growing demand from small and medium-sized companies. This is a new and dynamic area of Italian robotics, generated by the modular structure of robots, and of the workstations and work islands that are capable of producing a variety of items in different quantities and sequences, according to the specific requirements of the user company.

The fact that for decades Fiat has been pushing for the use of robotics for automobile manufacturing processes and the existence of a healthy basic research sector spread throughout much of the Italian scientific community explain the growth and success of this technological area and its sophisticated industrial culture. It is no coincidence that this area is prospering and developing in the climate of increasing cooperation among universities, industry, users, and the CNR [National Research Council], with its center in the electronics and mechanical engineering departments and the Bioengineering Center of the Milan Polytechnic. This was the point of departure where some years ago the CNR finalized project for mechanical technologies began, and this year the finalized project for robotics will begin, with CNR funding of about 70 billion lire for 5 years and a smaller contribution (about 30 percent) from industry.

The project establishes precise objectives: a transfer of the results to industry; the promotion and creation of a "robotics culture" in management and businessmen; the incorporation of robotics in non-industrial applications (ecology, agriculture, and other areas); and the spread of automation to small and medium-sized manufacturers. In this way, it continues the winning strategy that has today put Italy in a position to play a leading role in major EEC programs (EUREKA, ESPRIT, and FAMOS), contributing a number of

specific projects in the sector. At the same time, the country is able to increase and extend its research and development commitment in the new directions opened up by artificial intelligence (expert systems, man/machine interfaces, and so forth).

Chemicals

The fundamental weakness of the chemicals sector with regard to the horizons opened up by the new technologies lies in the fact that the industrial and financial structures in this sector are not yet as good as they should be, that the technical, scientific, and human resources are inadequate, that investment in R&D is insufficient and, finally, that there is a chronic deficit in the balance of trade for this sector. The sector is suffering from the consequences--which, in practice, are still latent--of the crisis created years ago by the conflict between the public and private sectors, as well as from errors regarding fundamental choices, the deterioration of the sector, and the inadequate resources allocated to basic and applied research in the most promising sectors for the future.

Having learned a lesson from the past, today many scientific, technical, production, and financial elements in both the public and private sectors are taking decisive action in the new directions taken by technology on these fronts. A good level has been achieved by state-of-the-art research carried out on the new thermosplastic matrices of the composite materials destined to replace approximately 40 percent of metal structures by the end of the century, while a respectable level has been reached by the state of the art of the new, low energy consumption, catalytic process and separation technologies. Major successes also have been achieved in fertilizers, the synthesis of new antiparasitic agents, surface-active agents, chemotherapeutics, and additives for polymers.

However, Italy is way behind in the young sector of biotechnology. This sector represents not only the key to development in the entire pharmaceutical sector but also in the sectors of tomorrow for vast areas of production in fine chemistry, chemical specialties, and the agro-industry: the chemistry of proteins, cosmetics, and biomasses. Factors such as the absence of a "biotechnology culture" and the lack of investments in basic research in an industry whose size and markets enable it to cope with the massive, high-risk investments required by the research programs in this area have meant that until now our activity in the vast range of opportunities opened up by the techniques of recombinant DNA and hybridization has been a matter of good intentions rather than concrete facts.

This is a situation that is destined to change--hopefully in the short term--as a result of state sector intervention, including implementation this year of a national biotechnology plan, with initial funding of 400 billion lire, for specific technological research programs presented by industry in the

sector, as well as two CNR finalized projects in this advanced research area, with funding of 150 billion lire. These are two opportunities that involve both the leading public and private research centers (Negri, S. Raffaele, the National Tumor Institute, and universities) and industries (Serono, Farmitalia Carlo Erba, and others). As such, they should stimulate the emergence of major initiatives that will have a substantial effect on the growth of a "biotechnology culture" on a level with the results that have begun to emerge over recent years with the finalized plans for fine chemistry. As Luciano Caglioti,. director of these plans, says: "What has happened in Italy is that a stimulus has been given for the birth of 'cultures' that were either totally lacking or relatively quiescent, such as the synthesis of polynucleotides and glycoproteins, the chemistry of sugars, and computer chemistry. The numerous patents taken out as a result of the various projects have led to a variety of applied research programs for various companies, funded under Law No 46."

Space

Today, after the leading role played by this company [Aeritalia] in the Ariane program, and the major role it is currently playing, together with Selenia Spazio, Laben, Fiar, and SNIA-BPD in the Columbus space laboratory project to be produced by ESA (European Space Agency) for the first U.S. space station scheduled to go into orbit in the 1990's, we have confirmation that this growth is continuing with particularly important effects for science, technology, and industry.

Today, in fact, we are witnessing the birth of the Italsat satellite, which provides preoperative telephone connections at 20-30 GHz with in-orbit testing of multibeam antennas and onboard switching. For the latter function CSELT [Research Center and Laboratories for Telecommunications] of Turin has produced a laboratory prototype for a multiple access [system] capable of implementing up to 16,000 simultaneous telephone connections. We also have the TSS tethered satellite for NASA, which will be used in variable orbits for observation of the ionosphere and magnetosphere, remote surveying, and other applications. The TSS also will test an additional propulsion system for the shuttle, designed by Aeritalia and SNIA-BPD. Last, we have the Lageos 2 geodynamic satellite for laser telemetering and geophysical prospecting, produced in collaboration with the United States.

The state of the art offered by our country in a number of leading edge technologies for defense and civil air transportation is in line with the most advanced technological capabilities available in other countries. The high level now reached is attested to by the production, in international consortiums, of fighter planes such as the AMX and the Tornado, and the contribution to the future European Fighter Aircraft [EFA] of sophisticated leading edge technologies such as the primary wing structure made entirely of carbon fiber. These capabilities also take the form of important products for civil applications, such as the development by Aeritalia, for Boeing, of wing

control surfaces and diving and heading rudders for the B.767 third generation jetliner. They also are evident from the agreements made with Douglas for the new propfan aircraft or the agreements between Agusta, Westland, and Fokker for production of the new generation A129 Mangusta helicopter. Finally, they are evident from the fact that our leading industrial and advanced research structures are participating in the most important and sophisticated leading edge projects such as the U.S. research program for the new space defense systems.

Hence, Italy holds a number of aces in this strategic area, since it is a case of betting on the winning card of collaboration and international consortiums; on technological growth in tandem with the European and American aerospace stars; and on the extreme sophistication of the products, systems, and projects to be implemented.

Electronics

The gap created over the years in microelectronics, optoelectronics, and data processing today conditions Italy's approach to these leading edge technologies in certain areas, making it different and, in some respects, anomalous. High-prestige names (Olivetti, SGS, Selenia, Telettra, CSELT, and Italtel) are involved in the major research areas which, obviously, are oriented toward the specific sectors of use involved. These organizations are characterized by a dynamic business approach, adopting a strategy aimed at making their activity increasingly international. Today this has become an essential premise if one is to be able to compete with the giant multinationals and to avoid missing the boat in terms of state of the art know-how. What we are talking about here is know-how based on increasingly higher performance miniaturization technologies for integrated circuits (VLSI and ULSI, Very Large Scale Integration and Ultra Large Scale Integration), whose objective over the next few years is to produce chips incorporating 100 million components with a capacity of 64 megabits on a few square millimeters (today the capacity of the most advanced memories is 1 megabit, with 1 million components per chip).

All this explains the reasons behind the agreements--either already drawn up or currently being defined--between Olivetti and AT&T, between AT&T and SGS, between Telettra and Italtel, and between Olivetti and both Toshiba and Hitachi. It also explains the reason behind the investment of the Ivrea group in more than 50 innovative companies in Europe and the United States, which, in the form of joint ventures, have been used to acquire new technologies and new products. It explains the fact that the [Olivetti] company has research laboratories in Cambridge, Palo Alto, and Boston; last, it explains the agreement with EDS of Detroit for the development of new software.

Moreover, it would be meaningless to attempt to draw comparisons with the financial resources, and the technical, scientific, and industrial structures

of the major world players in this strategic development area. Similarly, it would be meaningless to compare the contribution made by public sector intervention over recent years to research and development in this area, despite the fact that this intervention represents a major departure from the approach adopted in the past toward problems of this kind by the public authorities. In addition to the finalized plan for this sector, funded and implemented by the CNR (162 billion lire), a national program for microelectronics was launched last year. The cost of this program is estimated at about 100 million lire, and it will involve leading companies in the sector in research oriented toward concrete industrial implementations. A further 1 trillion lire has been set aside over the last 5 years by the IMI [Italian Institute for the Financing of Small and Medium-sized Comapnies] fund for specific advanced research programs proposed by national industry in collaboration with university institutes.

Moreover, the launching of the European programs ESPRIT, EUREKA, and RACE clearly demonstrates the desire of the governments of the EEC member states to implement European integration of the growing support being given to research in this strategic area, both to overcome to some extent the gap that has built up in the past and to achieve progress in the most promising directions. However, this is peanuts compared to a commitment on the part of the leaders in this sector (the United States and Japan) which is 2, 5, or even 10 times greater and which, unfortunately, leads one to believe that this gap will become even wider.

Let us incorporate in this area the new scenarios and ambitious objectives in research into new technological bases, linked to equally new and ambitious areas of application (defense, industrial competition, and the data processing society).

These include supercomputers capable of executing billions of operations per second, optical computers, and the entire sphere of leading edge technologies related to the increasingly outstanding computation speeds required not only by numerous branches of the scientific community (particle physics, metrology, artificial intelligence, and space research) but also by the requirements of the defense sector, entire sectors of industry, of geological prospecting, and of robotics. This is another field in which Europe is starting 10 years late (there are already 170 U.S. supercomputers in operation in the world), with a few advanced scientific research structures created only recently for the development of parallel computation (CERFACS in Toulouse, IBM Italy's ECSEC in Rome, and the European Facility for Parallel Computation and Simulation in Reading, England), as well as with a European supercomputer project put forward within the framework of ESPRIT by a group of French and British universities and industries.

Italy, for its part, has only one concrete project to its credit apart from a CNR finalized project to produce a supercomputer for industrial applications.

This is the work of the scientists of the National Institute of Nuclear Physics who, under the direction of Nicola Cabibbo of the G. Marconi Institute of Physics in Rome, have produced the first Italian supercomputer capable of working at a speed of 1 billion operations per second. This supercomputer, which is currently being used for the work on quantum color dynamics for the study of strong nuclear interactions inside the nucleus of the atom that take billions of operations to describe, actually is a general purpose tool that can be used not only for many other problems of nuclear physics but also for all types of simulation. Hence, it will represent an advanced computation tool for applications in a variety of fields.

Artificial Intelligence

Neurosciences and electronics both stimulate research in the young area of artificial intelligence for the development of programming languages and of new technologies capable of emulating man's ability to learn, and to make choices and decisions.

The specific research programs now in progress at IBM Italy, in the Department of Electronics at Milan University, at CSELT in Turin, and at CSM [Metallurgical Experimental Center] in Rome involve research into man-computer voice dialog, simultaneous translation, medical diagnostics, and expert systems for factories. These are the areas in which Italy is taking its first tentative steps in the development of these technologies for the next century. Italy also is participating in the feasibility project for BRAIN (Basic Research in Adaptive Intelligence and Neurocomputing), the first Community research program in this area, approved by the EEC and allocated funding of 30 billion lire this year.

On the other hand, the futuristic objectives embarked upon by the 200 or so Japanese and American researchers involved in molecular electronics have not aroused great interest in Italy and Europe. This research concerns the possibility of producing interactions between artificial and natural structures, with the objective of creating a direct interface between chips and the neurons of the brain.

This is a field that still verges on science fiction and which, moreover, does not exclude the theoretical possibility that, in the long term, it will be possible to create an analog-type biocomputer with a chemical or biochemical base, in which molecular electronics, biosciences, and artificial intelligence are combined to produce a hybrid or even "living" computer.

Energy

The know-how acquired by Italian researchers in fusion physics means that they now contribute regularly to this strategic area in all the international projects conducted in the field of magnetic confinement fusion. They are

making a decisive contribution to the European Community's JET program being conducted at Culham, England. Within the framework of this program, an Italian, Professor Toschi, heads the NET program for the design of a new generation of machines to be constructed over the next decade. A further contribution to this program is being made by Italy on the basis of an even more powerful machine that will make it possible to raise the temperature of plasma from 50 to 90 million degrees.

Another preliminary feasibility project is being conducted in parallel with this work. This project, which forms part of the European Community's fusion program (with 25 percent funding from the EEC), concerns an experimental machine, the Ignitor, based on a completely new concept of the Italian physicist Professor Coppi, a researcher with MIT. The objective of this project is to demonstrate the physical feasibility of controlled nuclear fusion through ignition of the tritium deuterium plasma in a more compact tokamak machine and using very high magnetic fields. There is also a group of Italian researchers from the universities of Padua and Milan on the EEC program. These researchers are using another original machine to conduct experimental work on magnetic plasma confinement with high-density thermic energy and high currents, in relatively low magnetic fields.

Let us now consider the alternative of inertial confinement of nuclear plasma. Because of the lack of resources and certain strategic choices, this work is not followed fully by either Italy or the EEC programs. Here we see that Italy's desire to create and maintain scientific and technological competence with experimental programs which, though limited, are of a high scientific level, so far has produced positive results. For example, the work conducted on the interaction between lasers and matter using the neodymium laser developed at Frascati will make it possible for this laser to be used for the compression and acceleration of flat targets, important for fusion. Free electrons lasers, again developed within the framework of this research, represent some of the most advanced instruments produced in Europe, and will be used in other technological applications related to the EUREKA program.

Clearly, there are a large number of technological spin-offs from this work, and so far it is industry that has benefited from these programs in terms of know-how and orders, specifically, Fiat, Ansaldo, LMI, and dozens of other manufacturers involved in the supply of superconducting magnets producing a high [magnetic] field, components for experimental machines, lasers, handling robots, advanced ceramics, power electronics systems and radiofrequency systems, and so on. This is only the tip of the iceberg in the vast sea of leading edge technologies in the energy field as a whole which, in complex synergies, affects almost every leading area of research and production in this country. These areas range from new materials for machines and the piping systems used for transferring mixtures of water and coal to feed the boilers in power stations, to the new technologies tested by ENI Research [the research department of the National Hydrocarbon Corporation] for transforming

gaseous hydrocarbons (which today are lost in the oil wells) into liquids; from progress in the photovoltaic field achieved with the chemistry of new materials, to biotechnology used to produce biomasses for energy applications; from the exploitation of new dry-steam fields, to the exploitation of other low-enthalpy geothermic resources for domestic heating; and from research in aerodynamics to increase eolian performance, to research in fluid dynamics to encourage exploitation of mini-hydraulics [minidraulica].

8616
CSO: 3698/M224

BRIEFS

FINLAND-PRC TECHNOLOGY AGREEMENT--Negotiations concerning collaboration in research and technology between Finland and the People's Republic of China were held in Helsinki on Friday. About 70 collaboration projects were presented during the session. The Finnish side in the projects is represented primarily by businesses, or research institutes and businesses together. The collaboration projects involve data communications, metallurgy, chemical industry, wood processing, and energy technology. Included are also projects within the areas of health care, agriculture, environmental protection, ship building, meteorological research, and packaging technology. In July Finland will open an industrial secretary's office in Beijing. Its task is to determine the possibilities of collaboration between the two countries, as well as to do the preliminary work to get joint projects started. The research and technology collaboration agreement between Finland and the PRC was signed last fall. The meeting on Friday was the first working session for the two countries within the framework of the agreement. The head of the Chinese commission was Tang Weicheng, deputy director of the international section of the PRC State Commission on Science and Technology. The head of the Finnish commission was Bo Goran Eriksson, negotiating officer from the Ministry of Trade and Industry. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 16 May 87 p 35]

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ROLE OF BIOTECHNOLOGY IN ROMANIAN S&T

Bucharest REVISTA DE CHIMIE in Romanian No 8, Aug 86 pp 657-663

[Excerpts from article by Mihail Florescu: "Biotechnology, a Priority Area of the New Scientific and Technical Revolution"]

[Text] The strategic objective established by the June 1986 plenum of the RCP Central Committee for the 1986-1990 5-year plan, Romania's entry into a higher stage, that of a moderately developed country, is leading to the creation of new economic and social structures which open up the prospect of a prosperous economy for socialist Romania by the end of the century, along with a flourishing culture and a civilization in which the dawn of communism will shine forth.

Stressing the fundamental importance of the plans and programs approved for the future development of the country, Comrade Nicolae Ceausescu, general secretary of the RCP, stated in his speech delivered at the plenary meeting of the National Workers' Council and the Supreme Council of Economic and Social Development that "these programs and plans mark the absolutely firm commitment of our country to carrying out the new technical and scientific revolution and the new agrarian revolution. We have special programs in this area. They have been widely discussed, at the Congress of Science, Education, and Culture and at the Agriculture Congress. Consequently, we must take all the measures needed to ensure unflagging pursuit of the goals of the technical and scientific revolution and the agrarian revolution, always proceeding from the fact that socialism and communism can be created only on the basis of the latest accomplishments of science and technology in all spheres and of human knowledge in general. Socialism and communism themselves mean science at the highest level, in all areas."

We live in an age in which the role of science in society has assumed new values, especially when we consider its applications in different sectors of the economy. "We must dedicate ourselves resolutely in the new technical and scientific revolution to the task of improving all industrial production and organizing it on a new basis. We must not forget for a moment that firm commitment to intensive development, to carrying out the new technical and scientific revolution, is of decisive importance in implementation of the party's program, in raising our country to new heights of progress and civilization. Any backwardness will have a powerful impact on the entire level of development for a long time to come." Such were the words of Comrade

Nicolae Ceausescu, general secretary of the Romanian Communist Party, in his speech at the 3rd Congress of People's Council.

Biogas installations utilizing animal waste in agriculture, urban sewage, and waste from privately owned farms have been extensively developed in Romania. Methanogenesis processes are conducted in fermenters of low capacity (5, 10, 25, and 50 cubic meters of biogas), medium capacity (100, 200, and 600 cubic meters), and high capacity (750, 1200, 1500, 3000, and 4000 cubic meters) installed in urban sewage treatment plants and at industrial waste water biological treatment plants. The qualitative methane component of the resulting biogas is 70 percent. The sludge resulting from methanogenetic fermentation is a very valuable fertilizer for agriculture. Hence methanogenesis creates an efficient biofuel while relieving environmental pollution and producing valuable fertilizer. The latest biotechnologies in this sphere, which have been elaborated by the Research and Development Institute for Waste Water Treatment (ICPEAR), are at a high technical level. They are completely automated, consume little energy, and are cost-effective. The biogas is used in generation of electric and thermal energy, as a fuel in motor vehicles, in irrigation pump motors, etc.

A total of 65,000 tons of conventional fuel was produced from biogas during the 1981-1985 5-year plan, and 600,000 tons of conventional fuel is to be produced by 1990.

The liquid biofuels obtained from bioconversion of a phytomass (methanol, ethanol, and to a lesser extent butanol) are highly important.

The Institute of Chemical and Biochemical Power Engineering of the Central Institute of Chemistry has developed a new biotechnology applying a continuous biomass process to produce superior gasolines with high octane ratings without using tetraethyl lead. The plants applying the process are undergoing industrial testing, and it is expected that significant amounts of gasoline will be produced during the 5-year plan.

Biotechnologies for conversion of wood to methanol are being developed in countries with substantial timber reserves. It is more efficient to convert this phytomass than it is to ferment agricultural waste to produce ethanol. These biotechnologies are expected to allow large-scale production of methanol from wood in the 1990s, so that in some countries (especially Canada, where these processes are being intensively developed) methanol will account for 45 to 50 percent of the consumption of gasoline for machines over the 2000-2020 period.

There has been significant development of research in the area of biotechnology at the Institute of Chemical Pharmaceutical Research. This research is aimed at meeting the needs of medicine and livestock raising through production of antibiotics, vitamins, amino acids, proteins, pest control agents, etc.

One promising field for use of biotechnologies is biometallurgy. Materials that are much sought after and total extraction of which by conventional technologies has proved to be inefficient or unprofitable can be obtained from deposits by means of microorganisms.

The economic gain from biotechnologies in the mining industry is estimated to be several billion dollars. Biotechnological processes have also been applied successfully in removal of sulfur from petroleum and coal, in petroleum extraction, and in environmental protection.

The Institute of Biological Sciences in Bucharest has developed strains of microorganisms for extraction of copper from waste dumps or from ores with a low metal content. Technological testing has been conducted by the Research and Development Institute for Nonferrous Metals in Baia Mare, and the Ministry of Mines, Petroleum, and Geology is currently building an industrial-scale plant for exploiting the waste of the Rosia-Poni mine.

The Institute of Biological Sciences has also developed efficient strains of microbes for zinc, lead, and manganese extraction, and research is in progress on strains of bacteria to be used in extracting nickel and gold from lean ores and wastes.

The prospects of the current biological revolution, the initiation of national programs and strategies for accelerated development of biotechnology, the broad spectrum of application of biological technologies in the chemical, metallurgical, and food industries, in power engineering, environmental protection, and bioinformatics, and the potential long-term developments, including the social and economic aspects, demonstrate that the progress is obviously being made in the start-up stage which currently characterizes this area and that the progress is highly promising. Biotechnologies are already being applied to solve specific problems in various sectors of the economy.

The field of biotechnology must strive to meet the needs of industry, and so the biotechnological research and development programs that have been drawn up harmoniously combine the resources afforded by industrial microbiology and genetic biochemistry with the elements of technology and engineering of bioprocess management and control.

The long-term development of the economy of the Socialist Republic of Romania and achievement of a qualitatively higher stage depend on the speed of development and application of leading edge technologies. Biotechnology is rated as a priority area in party and state policy toward scientific research, technological development, and introduction of technical progress. The national program for developing biotechnologies and introducing them into production assigns major objectives for biotechnological development in Romania, with emphasis on the following.

-- accelerated accumulation of basic knowledge and of modern operating techniques in the spheres of genetics, microbiology, biochemistry, and bioengineering;

-- development of new scientific branches in connection with the modern evolution of biotechnology, bioautomation, and bioinformatics;

-- intensification of efforts to train highly skilled specialists;

-- finding the most suitable ways of implementing biotechnological data processing in major practical applications and building pilot plants and experimental bases, for the purpose of improving the quality of bioprocesses

and creating a representative Romanian bioindustry. The program calls for development of biotechnological production over the 1986-1990 period amounting to more than 3 billion lei, along with investments in new production facilities based on biotechnologies representing a value of more than 7 billion lei.

In view of the extensive and significant restructuring which biotechnology has brought about and will continue to bring about at a faster pace in some sectors of industry, primarily in the chemical industry and the food industry, and in agriculture and medicine, we are entirely justified in saying that biotechnology has a revolutionary role of biotechnology and that it is capable of bringing about radical transformation of the national economy as a whole, primarily in production of material goods for meeting the ever growing needs of our society in full development.

Biotechnology is also one of the priority directions of scientific research under the integrated program of technical and scientific progress of the CEMA member countries to the year 2000.

The research conducted in this sphere must ensure substantial increase in food resources, the mineral resources of deposits with a low metal content, power engineering resources, development of products without waste, prevention, diagnosis, and treatment of diseases, and maintenance of public health and environmental protection at a high level.

Achievement of the priority objectives will result in widening the range of active biological substances, medicines, microbiological agents for plant protection, new and highly productive varieties and hybrids, bacterial fertilizers, and plant and animal growth regulators, and production of proteins and enzymes.

In connection with cooperation with the CEMA countries and all socialist countries and with implementation of the programs established and the 1984 high-level conference on economic problems, Comrade Nicolae Ceausescu, general secretary of the RCP, stated in his speech at the plenary meeting of the Central Committee of the Romanian Communist Party held on 13 November 1985 that "we are also resolved to participate actively in the integrated program for research and technical progress, both for the purpose of satisfying the needs of the socialist countries in this sector and for achieving rapid development of our countries, on the basis of the most advanced technology."

In the priority area of accelerated development of biotechnology in the integrated program for research and technical progress, the specialized Romanian institutes in the sectors of chemistry, food production, biology, agriculture, and medicine will participate as coordinating or cooperating agencies in the conduct of numerous special research projects, for which purpose combined research teams will be established.

We are entering an era of revolutionary transformation of conventional fermentation processes marked by transition from natural selection of strains of bacteria to creation of highly productive microorganisms by genetic engineering methods, above all by the recombinant DNA technique. Biotechnology and bioengineering open up the possibility of creating useful products in some sectors of the economy.

In the current economic,social, and political context, biotechnology is regarded as a major factor in progress for the sake of prosperity and active international cooperation and for the sake of peace and friendship, noble causes to which all who work in the area of Romanian science and technology enthusiastically subscribe.

6115
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PROGRESS OF NEW BIOLOGICAL CENTER NOTED

Prague RUDE PRAVO in Czech 23 Feb 87 p 5

[Article by Michal Strida: "On to Phase Two: The South Bohemian Biological Center at Center Stage"]

[Text] The year 1957 saw not only the launching of the first Soviet satellite, but also the founding of a Siberian division of the USSR Academy of Sciences. This division was established to conduct basic research related to what was known in the USSR as the mastering of Siberia. This program involves both the accumulation of general knowledge about Siberia, but also the identification of its natural resources and proposals for exploiting them. Akademgorodok--scientific town--has since become a model for the establishment of similar regional research centers in both socialist and capitalist countries.

Based on several information-gathering trips, the Japanese used the Akademgorodok model for several scientific research centers, the most important of which is located at Cukuba. This research center was the site of a world exhibition in 1985.

The idea for a South Bohemian Biological Center was raised in 1974 at a CPCZ Central Committee Plenary Session concerning R&D progress. After this session the Czechoslovak Academy of Sciences [CSAV] was assigned the task of building regional centers in individual krajs. This resolution formed the basis for the construction of the South Bohemian Biological Center of the CSAV [hereafter the Center]. The mission of the Center is to contribute to R&D progress, as well as to expand knowledge in a very important field of science. Phase one of construction was completed in 1985.

At that time a new, modern facility of the CSAV opened, housing the Entomology Institute, the Parasitology Institute, the Territorial Ecology Institute, and the newly organized Soil Biology Institute, in addition to the Center. The facility also houses joint laboratories, equipped with expensive, state-of-the-art equipment, for the use of all the participating entities.

I toured individual worksites in this facility with Academician Vladimir Landa, the director of the Center. These are modern, spacious laboratories outfitted with state-of-the-art instruments and equipment that would be

the envy not only of researchers in Prague, but anywhere in the world. "Establishing new institutes and outfitting them with modern equipment was no easy task," notes director Landa. "But the most important thing we have achieved here," he emphasizes to whoever he shows around the center, "is that we have put together collectives with a high level of professional expertise and which are capable of solving the most difficult problems. The best part is that these collectives are all made up of young researchers who have their best creative years ahead of them." This is in part certainly due to the fact that older researchers did not want to leave Prague, even though Ceske Budejovice is much closer to Prague than Novosibirsk is to Moscow. Prague is only 3 hours away by bus, as opposed to the 6-hour flight from Novosibirsk to Moscow. Time has shown, however, that scientific research can be performed elsewhere than in large cities. In fact, remote locations are often preferable because they are less hectic and more comfortable. The Center indeed provides a comfortable working and living environment which includes new apartments made available to arriving scientists by the kraj national committee.

The Center at last has functioning telephones almost everywhere, a library that is already respectable and in the future will be better still, and access through computer terminals hooked up to the Center for Scientific and Technical Information to necessary information from practically every database in the world. Moreover, anyone who has been able to take a bike ride after work to the Hluboka estate, or along the Vltava River to Tyn, or who has been able to swim at Bezdrev, or take a ski trip in the winter to Klet would probably agree that it is not bad at all to do research work away from a metropolitan area. Most of the physicists working at the Joint Nuclear Research Institute in Dubna near Moscow or at European Center for Nuclear Research [CERN] near Geneva would probably also agree.

The volume of information is increasing by the day, at the same time that the world is becoming smaller. These two realities make it on the whole preferable to do important scientific research in smaller towns. This is also desirable because it puts the researchers closer to daily practice. The South Bohemian Biological Center, after all, combines institutes whose research has application in agriculture, forestry, health care, and to environmental problems.

Again in the words of Academician Landa: "As with all other areas of our society, science today finds itself in a period where accelerated socio-economic development necessitates an improvement in its efficiency and a change in its structure, as well as the goals and thought processes of its researchers. The CSAV is aware of these new tasks for science and the new demands being placed on it and has therefore developed a Program for the Development and Application of Science Within the CSAV for the Eighth 5-Year Plan and Projections Through the Year 2000. This report is highly critical of current work and defines an alternative approach for entire scientific groups to fulfill the tasks being placed on science by our society. For those of us at the Center the fulfillment of these tasks is more important because we are a young facility which is only now developing a structure. This gives us an opportunity to create a working environment appropriate to the goals of the future."

The institutes at the Center are working on a number of tasks in the state plan for basic research, including plant protection, increasing soil fertility, reducing the incidence of parasite-related diseases in feedlot operations, improving breeding techniques, optimizing economic management in rural areas. At the same time all of the worksites subordinate to the center are striving to have the fruits of their research become the basis for new technologies, and are therefore focusing their efforts on the priority tasks of the Comprehensive Program for R&D Progress for the CEMA Member Countries. These tasks include the study of new substances for plant protection, research on insect hormones such as juveniodes, feromones, and sterilants, as well as the study of tropical diseases and new breeding techniques that make use of genetic engineering. The Entomology and Parasitology Institute and the Experimental Botany Institute are working on the most important tasks of this program, among them the use of microbiological substances for plant protection and for the fixation of atmospheric nitrogen.

The problem of improving the quality of international R&D cooperation is closely related to this work. The focus of efforts in this area should be on long-term residency programs. Scientists from socialist, Third World and capitalist countries would all be interested in such programs, especially since the quality and breadth of capability of the Entomological Institute in Ceske Budejovice is quite probably unique in the world. It is therefore natural that scientists from all over the world are interested in long-term residency programs, because these are one of the most effective forms of scientific cooperation. Such programs run on an exchange basis would also give our young researchers the opportunity to obtain experiences at the most famous research centers of the world.

In this regard it is also important to note that a scientific and pedagogical association has been established among the agronomy department of the Agricultural College, the pedagogical faculty in Ceske Budejovice, and the Center. This will make it possible for researchers at the Center to take part to a greater extent than before in pedagogical activities. This will enable them to communicate to the upcoming generation of researchers and teachers the latest findings of basic research. This will also facilitate efforts to locate promising talent both through contacts with the Young Natural Scientists Club, with the activities of which employees of central agencies are already involved, and through various forms of long-term cooperation with high schools.

The South Bohemian Biological Center has already become an inseparable part of the life of the South Bohemian kraj. One need only recall the construction of a laboratory for breeding natural enemies of the pests that were destroying crops. This project has already saved 20 hectares of greenhouse growth, cucumbers and tomatoes in the CSR. This center for the biological protection of plants was built at the Chelcice JZD. Another example is feromone traps for bark beetles found in the South Bohemian forests, and measures taken to protect fish from parasites. The Center plans to continue to support and expand on these programs, because this is the only way

that the South Bohemian kraj will be able to participate fully in the fulfillment of not only the tasks facing our society in the Eighth 5-Year Plan, but also the tasks confronting the entire community of socialist countries in the late 1980s and early 1990s.

Construction of the Center has entered phase two. This will involve the construction of the Experimental Botany Institute, new buildings for the Soil Biology Institute, libraries, a center for scientific and technical information, lecture halls, a mathematics center. Preparations are under way for phase three.

We are now walking through a glass enclosed hallway connecting individual worksites of the Center. Paper silhouettes of birds of prey are pasted on the glass.

"These are to frighten off swallows that flew between the buildings," explains Academician Landa, "and then killed themselves flying into the glass." The designer could not have foreseen it. We felt sorry for them, so we solved the problem this way. After all, we are a biological center."

9276/9604
CSO: 2402/20

CSSR: DEVELOPMENT OF INNOVATIVE CHEMICAL PRODUCTS

Prague HOSPODARSKE NOVINY in Czech 23 Jan 87 p 7

[Article by Eng Jaromir Lojka, technical director, Brno Lachema, general directorate: "Only Originality Counts"]

[Text] Many industrial sectors depend on deliveries of specialty chemicals. To a large extent we still must import these chemicals, even though we could produce many of them ourselves. We have the capability not only to produce enough for our own needs, but also the capacity to produce specialty chemicals for export. What is preventing us from doing this? Is it only shortcomings in the management of the R&D base of the specialty chemical sector?

The requirements of the electronics, engineering, agricultural, health care and other sectors are such as to require a gradual and managed restructuring of the production base of the Czechoslovak chemical industry. The external factors that affect our economy will also play a role in speeding up the restructuring of the capital stock of the chemical industry. The overall objective is to increase specialty chemicals as a percentage of total chemical industry output from 18.2 percent in 1985 to 25.5 percent by 1995. Over the long term sufficient reserves will have to be generated to allow international trade in specialty chemicals with both socialist and nonsocialist countries.

Systemic Measures

The planned growth rate for specialty chemicals in the CSSR will require a number of measures in the management of the innovation process, with the objective of increasing the efficiency of R&D work related to specialty chemicals. This should not be understood in the narrow sense, however, that measures would be taken in only one part of the innovation process in research. On the contrary, it will be necessary to establish economic controls on the innovation process that will exert the same influence throughout the entire innovation cycle, and which can therefore assure that a pro-innovation environment will exist to stimulate the development of specialty chemicals.

Specialty chemicals have their own characteristics that distinguish them completely from the large-batch production of basic chemicals. These characteristics are evident mostly in the preproduction stages, and then in the applications of specialty chemicals. These characteristics include a high level of innovative activity, with a dominant role played by product innovations. New products are put on the market every 3-5 years. These often involve significant qualitative leaps in the use values of the new products, which in turn frequently have an impact on the use values of the final products of the end user of the specialty chemicals.

The preproduction stages comprise an entire complex of innovative activities which require high noninvestment expenditures on research and marketing of new specialty chemicals. In nonsocialist countries, for instance, costs for research, registration and marketing of an original medicine can run as high as $90 million. On the other hand the annual revenue potential of a heavily consumed medicine is in the $100 million to $600 million range. A similar situation exists for pesticides, diagnostic preparations, photochemical materials and other specialty chemicals.

While there clearly will be little place for Czechoslovak originality in specialty chemicals, even in projections through the year 2000, we still need to allocate some of our production capacity in this area. We should keep our eyes on those aspects of the development of specialty chemicals where lesser levels of originality and innovation bring significantly reduced development costs. We must also keep in mind, however, that the economic potential of such products is commensurately less as well.

Appropriate Choice

The choice of an appropriate innovative idea is a critical point in the innovation process. In making these choices today we must attempt to break away from the mere copying of the status quo elsewhere. These choices must be made with a high level of professional awareness of the development of the technico-economic parameters of specific specialty chemical product groups. Of equal importance is the comparison of projected developments in the CSSR and world trends. It is particularly important to understand the price evolution of a product, the length of time that a product is economically viable, to determine the market potential for products during the R&D phase, etc. In our country we have not yet mastered the prediction of market potential for a given product because of the rapidly changing needs of end users. The way to rectify this situation is a significant increase in the role of commercial service organizations by upgrading branch offices at the VHJ level. This could also take place at the firm where the chemicals are actually made, and must be accompanied by an increase in the quality of the market research work of foreign trade organizations.

The objectives for the development of the specialty chemical sector are set by state R&D policy. Individual sectors, VHJ, and enterprises are then responsible for breaking down these overall objectives into technical development plans. At this stage there are numerous shortcomings in the material and scheduling consistency of these plans between specialty

chemical producers and the users of these chemicals. User demands are often made without sufficient lead time, or products with the requisite specifications are not available, or product requirements change radically during work on technical development tasks. Moreover we have not yet overcome the perception that our chemical industry needs to produce practically an entire range of specialty chemicals. Following this strategy would fragment the resources and facilities of the R&D base, which would in turn have numerous negative consequences for the economy.

Requirements for specialty chemicals can be met with domestic production based on the technical capabilities of the CSSR, supplemented by foreign trade in specialty chemicals. The foreign trade activities of user sectors play a role here as well.

An important factor in planning technical development in specialty chemicals is an evaluation of the degree of risk and uncertainty in the innovation process, including the adoption of any risk minimizing measures. Such risk assessment is an important aspect of innovation and cannot be ignored. It is on principle unacceptable to eliminate risk from the innovation cycle at the price of economic losses caused by substandard technico-economic specifications. It is therefore essential to accept risk as an inevitable part of work on technical development tasks. R&D managers in the specialty chemical area should adapt their systems to this high degree of randomness in chemical research.

Evaluating the Whole

The results of R&D must be evaluated as a whole, rather than determining the success or failure of each project. For example, leading world producers of specialty chemicals in the FRG use fewer than 50 percent of the results of their research projects. Nevertheless chemical firms in the FRG that deal in specialty chemicals are among the most economically successful in that country.

This is one area where we must utilize the advantages of planned management while strengthening the independence and responsibility of VHJ for overall R&D results. To minimize the risk when deciding whether an innovation project is feasible or not, the question of so-called nonparametric research comes up. The result of this type of research is an accumulation of the necessary technico-economic information for a decision to be made. This cannot be understood as an extension of research or even as a cost of research, but rather as one of the tools for making innovation more effective. In the event that we happen to make a wrong choice among the entire complex range of specialty chemicals, if we set ourselves an unrealistic goal, then all subsequent stages of the innovation cycle will result in more or less negative consequences.

As I mentioned in the introduction, the chief source of economic potential is the originality and progressiveness of given innovations. It would therefore make sense to set aside some of the research capacity in specialty chemicals for high-risk research on original chemicals that would have

access to the results of basic research at our colleges, universities, and the Czechoslovak Academy of Sciences. Experts estimate that some 20 percent of an applied research facility should be allocated to this type of research. This means that we should amend the planning methodology for technical development to include this type of risky applied research. The methodology should also be modified to provide improved conditions for the practical application of R&D findings to production, as well as conditions for establishing production and research cooperation with a foreign partner. This will limit the exporting of intellectual capital in the form of licenses.

Adaptable Facilities

Because time is another important criterion affecting the economic potential of new specialty chemicals, and because the frequency of innovation is so high, now is the time to begin construction of light, adaptable facilities for the needs of the specialty chemical industry. At present we do not build such facilities. The advantages of these production facilities is that they allow changes to be made to groups of equipment, allowing the maximum possible adaptation of existing equipment to rapidly changing chemical technologies. No less important is the fact that construction time for such facilities is very short. The potential to use a facility flexibly is one of the fundamental conditions for implementing new R&D findings while simultaneously reducing the risk in the production of specialty chemicals.

During the decisionmaking process on whether or not to pursue a given innovative idea, specific consideration is given to the fact that the economic potential for an end user of a specialty chemical can often be many more times greater than the potential for the producer himself. Examples include pesticides and nonantibiotic growth stimulators of animal growth.

The planning methodology of scientific and technical development allows the economic benefit to the user of a specialty chemical to be fully included in the overall evaluation of the efficiency of the results of given research programs. The figure that quantifies this benefit serves as a reference point when evaluating the technico-economic efficiency of an innovative program which results in the production of a given product. Naturally, the benefit to the user is not monitored during the actual production stage.

In extreme cases this implies that what appears to be effective in the lab is not necessarily effective for the firm that implements these results. at the same time the benefits to the entire society are demonstrable.

What is the solution here, if technical development is logically the main source of economic benefit for every producer of specialty chemicals? Mainly, it will be necessary as much as possible to merge the methodology for planning and for evaluating the efficiency of individual parts of the

innovation process. Then it will be necessary to determine the return on capital assets for specialty chemicals in comparison with the return in other branches of the chemical industry. The current rate of return does not provide enough incentive to develop the specialty chemical sector because of the greater level of risk and precision required by this sector. The problem of the low rate of return on capital assets in specialty chemicals could be resolved by an intersectoral reallocation of profits among producers and users of specialty chemicals in those areas where the user is deriving great benefits. This will generate pricing incentives in the area of advanced R&D outputs.

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YUGOSLAV COMPUTER FIRMS EXHIBIT GOODS AT 'INTERBIRD'

Paris ZERO UN INFORMATIQUE in French 12 Jan 87 p 30

[Article signed Josip Rajman: "Meeting of East and West"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] Interbiro is the Yugoslavian SICOB [Computers, Communications, and Office Automation Fair]. This exhibition devoted to data processing technologies is the meeting point for Western and Eastern technologies. They seem to be getting along well.

The Zagreb trade fair has just hosted the 18th Interbiro. In a festive atmosphere, it became clear that Yugoslav cooperation with both East and West has given rise to some very modern hardware and software adapted to the country's needs.

How to describe the Yugoslav data processing environment in a few words? Thousands of microcomputers have been brought into schools at all levels of education. In addition, a new kind of computer specialist has appeared in these socialist countries: Over the last few years, hundreds of small companies--most of them private--have targeted specific markets.

Most of these entrepreneurs are Yugoslavs who have returned to the country after working elsewhere for several years. They have been allowed to import their equipment duty-free. One group is making diskettes, others clean them and provide maintenance, others make peripherals as OEM's, while some even build micros.

Many individuals write programs on their own, usually as specialists in one given field. Other private companies sell programs or arrange exchanges.

So new products were certainly not lacking at the Interbiro fair in Zagreb. Here we will mention the most outstanding.

AS Impex (Novi Sad) makes four models based on the Nixdorf 8870 line. Their main memory capacities range from 256 K to 6 Mb, while their Winchester disk capacities go to 320 Mb. All models have optical scanners and bar code readers.

Birostroj (Maribor), which has worked with the East German Robotron company since 1956, has signed a 5-year contract for joint production valued at $50 million. According to this contract, the RGB (Robotron, Gorenje, Birostroj) group will produce a few dozen machines. In addition, the new RGB 105-G printer will now be compatible with the IBM-PC, Commodore, Epson, and other microcomputers. It also workers with all Yugoslav PC's (Partner, Ei Pecom Lola, Paka).

Birostroj has also developed its own 8-bit office system: the Binar BC-300. It has 64 or 756 K RAM and a 22-Mb Winchester disk. By attaching various optional modules, it can support graphics applications and links to public networks.

Ekonomski Biro (Belgrade), which represents Mannesmann-Kienzle in Yugoslavia, distributes the MCS-9100, a multistation system which can support up to 32 workstations. It has a 2-Mb main memory.

Elektronska Industrija (Nis) is continuing its joint work with Honeywell to produce the 6/85 and 95 32-bit models. Three Superteam models with 20-Mb capacity, 870-Mb disks, and up to 64 connecting lines are available. As for the Superteam PC (EP, XP, AP), it has a 256-K main memory and 4-Mb disks.

In Cooperation With French and American Companies

The TX-35-E telex with five possible configurations is the result of collaboration with the French company Sagem. Collaboration with the American company Brandt has produced a banknote-counting machine (from 500 to 1,000 bills per minute). As a result of a joint effort with Honeywell, the Yugoslav railroad is installing 330 ticket printing centers.

Following several years of collaboration with Control Data and Bunker, Energodata (Belgrade) has developed its own CAD/CAM system: Edvis. It runs on NS 32016 and 32080 microprocessors with 40- to 80-Mb disks. Its virtual memory control system makes it possible to increase its output.

Energoinvest (Sarajevo) manufactures the 16-bit Iris PC with a 1-Mb main memory capacity and from 20 to 40 Mb on disk. This system also supports the Qual relational DBMS [Data Base Management System] developed by S. Alagic in Yugoslavia.

Gorenje (Titovo Velenje) has developed two systems to monitor working hours as a follow-up to the Joseph-Stephan Institute project. One manages up to 116 terminals (16,000 workers), the other supports up to eight terminals (1,200 workers). Workers can receive information from the workers committee printed on their card as they clock in.

IBM displayed the PC/AT (IBM 6150) microcomputer at Zagreb, as well as the PC/AT 3 and XTS with a 3812 printer. Banking systems were demonstrated on the IBM 47XX, and the SQL database inquiry system linked to the IBM 4341 was shown on the 32XX.

ILR-Ivo Lola Ribar (Belgrade), which is well known for its programmable machine tools, is now offering a new version of the Lola 8 B micro, which is very popular as a home or school computer. It has graphics capabilities and three 8-octave audio channels.

Iskra Data (Ljubljana) is offering a new line of Paka 5000 terminals, which are VT 220- and VT 100-compatible. The very popular Partner PC (128 K RAM, 682-K diskettes, and 10-Mb disks) also supports Thomson's EF-3967 graphics capabilities. They also displayed a system which combines the VAX 8300, 8500, and graphics workstations with terminals linked to Ethernet, as well as software creations for use in manufacturing and agriculture.

Ivasim (Ivanic Grad) produces the Script Ivel word processor (64 K with 64-K diskette and 20 Mb on disk) and IBM-compatible terminals.

Javor (Bitola) offers the new 16-bit IBM-PC/XT-compatible Micro Bit. Some 200 CPU's have been made under Bulgarian license, and over 100 data entry units have already been installed in Yugoslavia.

Kopa (Slovenj Gradec) has three new micros in its catalog. The largest, the VAX-compatible Kopa 4500, has a main memory capacity of up to 16 Mb.

Mladost (Zagreb) offers the full ICL line. This company's PC's are distributed primarily through Robna Kuce's 40 "Beograde" supermarkets (in 30 cities).

MM Technics (Saint-Helier, Jersey, Channel Islands) is a new company which imports hardware from Hong Kong, Taiwan, Singapore, South Korea, and Japan for distribution in Yugoslavia and Europe. This company is managed in part by Yugoslavs.

Narodne Novine (Zagreb), which represents the Swiss company Ruf, has improved its own micro the Nano OM-Z-80, as part of a Joseph-Stephan Institute project. This institute launched the production of graphics peripherals, and is developing software to analyze and optimize industrial manufacturing processes.

In a joint venture with Phoenix Technologies (New York), Naronaplast-Magmedia (Metkovic) makes pretested diskettes guaranteed to be error-free. Nikola Testa (Zagreb), working with the Swedish firm Ericsson, has installed remote data transfer systems in Slovenia and Croatia. It will continue this installation in four other republics, under the control of the federal PTT's [Post, Telegraph, Telephone].

Novkabel (Novi Sad) has improved its PC, now called the ET-188-A.

In collaboration with Olivetti, Radioindustrija (Zagreb) makes the Riz 24 in two versions: one with 128 K main memory and 20-Mb disks, the other with 640 K main memory and 10-Mb disks. Several optional processors are available: communications, network, color monitors, mathematical processing, etc.

Robotron (Dresde) demonstrated a hotel reservation system which manages up to 300 rooms. In recent years this company has manufactured some 4,000 small

office computers and calculating and invoicing machines; in the past, close to 12,000 primarily mechanical machines (Ascota, Soemstron, etc.) had been imported in this category.

All Kinds of PC's, But Software is Not Forgotten

Together with ADS Anker, Rul (Leskovac) makes several models of cash registers. This company recently began production of two banknote-counting machines, one of which weighs only 10 kg.

Infosistem distributes Sperry's PC in Zagreb. Today there are reportedly over 40 System 1100's and 22 System 90's in Yugoslavia.

Tuornica Racunskish Strojeva (Zagreb) introduced its TRS-901 network-oriented microcomputer. This company uses fiber optics in its star or loop-configured local area networks (LAN TRS), which link as many as 254 systems.

Velebit (Zagreb) introduced three new IBM/XT- and AT-compatible PC's. Their main memory is 512 K, their disks up to 21 Mb. The new real-time digitizing plotter, which is IBM-compatible, is to be used in scanners and electron microscopes. It is already used in thermography, robotics, drafting, and quality control. The screen has a 512 by 512 pixel definition. The palette includes 16 million colors.

Among the software products are Micro-Biblio and Thesaurus for libraries, Yulex in the legal field, Medvis for patient records, Pharma for pharmacies, OECD for country-specific economic indicators, and Mikrostat for statistical methods.

The Zagreb university center has been in demand internationally since the organization of the 1984 Sarajevo Winter Olympics (the software was sold to Calgary in Canada). It helped create the software for the Los Angeles games and had total responsibility (from a data processing standpoint) for the 1986 Moscow Friendship Games.

The group of experts managing this center will be responsible for preparing the 1987 Zagreb "Universiade" on two IBM 3083's with approximately 300 terminals.

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TIME FOR MAJOR TECHNOLOGICAL STEP FORWARD PAST DUE

Budapest MUNKA in Hungarian No 2, 87 pp 4-5

[Article by Istvan Matko: "Instead of Falling Back--Breakthrough"]

"...All through that period of 40 years we had to tread the spendthrift path of the poor. We almost always consumed and destroyed those reserves that could have provided the foundation for the success of the next period."

(Quoted from a speech of Tibor Vamos)

At the end of 1986, society found itself facing an ominous problem: if it could not reverse the trend toward stagnation, then its hard-won values--economic equilibrium and balanced development--could be endangered. The stalling of the economy in the mid-1980's could be attributed in many respects to technical and technological backwardness and an often stumbling pace of technological development. Intellectual creative work has been devalued, but technological achievements are not esteemed highly enough by the domestic system of values.

And yet it was precisely the changes in the world economy, taking place at an accelerated pace since 1970, which demonstrated that all raw material resources and materials of all kinds--including energy, agricultural products, and foodstuffs--had, after some transient and unrealistic jumps in prices, become devalued, and intellectual achievements alone were rising ever higher. On our imaginary stock exchange it is electronics, information science, high precision machine industry, and biotechnology that bring the highest prices. We might add that the profit and economic advantage obtained through these are rewriting the situation and the interrelationships of geographical and economic regions. Those left behind find the gap growing even larger, so that they may end up in a position from which they can never catch up.

It has been clear to us for some time that the progression of Hungary's economy and society will depend on whether we will be able to swim with the current of the scientific and technical revolution and to renew our activity in the field of technological development and research. Are we going to be able to make this breakthrough both in the area of technology funding and for intellectual creativity in the societal scale of values? The question can, of course, be put in a more practical manner: will there be enough money and

enough manpower for the change? Or if not, then the gap between us and the developed world may grow to catastrophic dimensions. We would then slide back into the ranks of those countries which must face gradual impoverishment because of their outmoded production structure and product structure.

But where can we find the money for taking these important steps?

The Central Committee has said the following: we must have controlled, selective, export-oriented development. And the resources needed for this must be created both out of the national income and from foreign sources. This means that no matter how difficult it is, no matter how many problems it involves, in the coming years we cannot afford to delay (for the sake of consumption) the technological advances that are urgently needed, primarily in the processing industry, electronics, the machinery industry, biotechnology, and the food industry. Similarly, we cannot afford to delay more vigorous financing of basic research, for sensible and carefully selected purposes.

The journalist, who is perhaps more sensitively affected by everyday events than the economic historian preparing diagnoses for the longer term, cannot fail to voice certain doubts he has in this matter. For example, there is the tragic headlinemaking event of 1986, the fire which destroyed the modern chip-manufacturing plant of the Microelectronics Enterprise (MEV). Therewas, and there continues to be, a great deal of debate in our country on the question of whether or not the so-called BOAK's (Equipment-Oriented Circuits--EOC's) were the result of successful development--but this company's production represented the most advanced level of Hungarian electronics. MEV also is (in theory) part of the motivating sector, so that a type of work ethics became accepted which (indirectly) produced a ferment in industry and at the same time supplied users with components. After the fire, in practical terms, MEV found itself in a crisis situation and had to reduce its labor force, which means that it must expect a reversal of its development. At the same time other reports were talking about (forcibly) rescuing Ganz-MAVAG (Ganz Hungarian State Iron, Steel and Machine Factories) and ferrous metallurgy and "giving them a shot in the arm." On the other hand we have the continued nurturing of a backward, money-losing, and truly outdated production system and a reversal of the development of a full-grown structure which embodies the concept of modern activity in every way... This is not the direction in which it is worth our while to proceed. We should set into motion systems of conditions in economics, incentives, and institutions such that a value system that can be considered modern can be set up in Hungary too, a system of conditions which is aimed at achieving the only promising road to the development of society and which does not sacrifice innovation and modern requirements on the altar of social peace.

The Far Eastern countries which are re-industrializing and are treading the path of new progressive development (countries which have hardly any tradition in industry compared to ours) are able to reach double digit growth rates and favorable foreign trade balances by virtue of the fact that they have been importing the most highly developed industries and technologies for the past few years. This has been done either by letting multinational enterprises establish their automated plants there or by developing the countries' own national industry with great foresight. Simply as an example, I may mention

that many years ago Hungary mass-produced excellent radios (Telefunken, Orion) at a time when South Korea, Hong Kong and Taiwan had hardly even seen any radios. And today? Hong Kong's semi-professional [sic] computers and computer-technology equipment are easily outdoing their Hungarian competitors in price and quality. Long ago Weiss Manfred produced state-of-the-art military aircraft and excellent machine tools and marketed them at a time when wooden plows were considered "modern" machines in South Korea. And today? South Korea's machine-tool export industry alone exceeds the total exports of CEMA on West European markets.... Not to mention radio traansceivers and transmission technology.

Where shall we get the money for development? That is not the right question. We must pay the price of development for the sake of the present and the future. And this demands a new system of priorities--at a time when, unfortunately, years have passed since our annual balance sheet has shown an increase in real wages, at a time when we might agree completely with the demand that we should at last raise real wages and start a program for the immediate improvement of the standard of living.

It is worth while, however, to heed the lessons of our historical experience and the sober arguments of policy: now is the time for giving preference to the economic and technological structure, so that we can use it to "produce" an increase in the standard of living that will be lasting and will stand on firm foundations and be self-regenerating. We already have the historical necessity for them, and perhaps also a mature enough society that is well informed and looks to the future. We also have the elementary demand which in the socialist community serves as a new source of strength for promoting development. This is the scientific and technological program of CEMA for the period until the year 2000, which the member countries have decided upon precisely because they want to keep pace with the rest of the world. In Hungary too, we can have no other sensible task than this.

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BRAZILIAN-ARGENTINE BIOTECHNOLOGY CENTER

Brasilia BRASIL CIENCIA in Portuguese 11 Apr 87 p 3

[Text] This Monday, the Brazilian-Argentine Biotechnology Center was opened in Brasilia by the minister of science and technology, Renato Archer, and the Argentine secretary of science and technology, Manoel Sadosky. For the first time in Latin America, two countries have joined together to create a binational center for promotion and coordination of scientific research and business investments in the strategic field of biotechnology.

The Brazilian and Argentine authorities stressed that biotechnology can help not only those two countries, but also the other nations of the continent, to deal with the serious problems of dependence on the large centers, as well as the challenges of the highly competitive international economy. Participating in the project are public agencies, universities, research centers, and business firms of both countries, interested in studying new solutions and in thinking up new products in the fields of pharmaceuticals, staple foods, and alternate energy sources.

The Brazilian-Argentine Biotechnology Center has an initial appropriation of $4 million, $2 million from each country.

As part of the Brazilian-Argentine biotechnology program, the Binational School of Biotechnology is being created, similar to the one established 2 years ago (EBAI, the Brazilian-Argentine School of Computer Science), its purpose being to train intermediate and high-level specialists.

The first course at the Brazilian-Argentine School of Biotechnology will be held next February, in Curitiba, for 2 weeks, with an intensive plan of classes and seminars.

In the energy field, the center will be required to conduct studies on waste treatment and the use of sugar cane waste to produce energy. Also planned is the creation of enzymes, as well as other biological components, to produce antibiotics.

Consisting of a binational deliberative council (comprised of eight representatives from the two countries), the center has a higher decision-making body,

responsible for the establishment of its policies, priorities, and lines of action. The first meeting of this steering body was held in Brasilia on 6 and 7 April. The executive secretary of the Argentine National Biotechnology Program, Jose de la Torre, was chosen general director of the center. Two deputy directors were also assigned: the Brazilian, Edmundo Reichman, and the Argentine, Rodolfo Ertola. The general director's position will be rotating, with a 2-year term.

2909
CSO: 3699/62

POSSIBLE BRAZILIAN-FRENCH COOPERATION IN BIOTECHNOLOGY

Sao Paulo FOLHA DE SAO PAULO in Portuguese 2 Apr 87 p 17

[Text] Yesterday, an interministerial delegation from France submitted to the Ministry of Science and Technology a proposal for scientific and technical cooperation in the field of biotechnology.

The cooperation would be carried out regarding projects developed jointly with Brazilian universities and research institutions, financed mainly by the French. The original idea of creating a Franco-Brazilian biotechnology center was rejected.

According to the secretary of biotechnology of the Ministry of Science and Technology, Paulo Torres, aged 55, the French proposal is quite vague, and contains controversial points, such as the cooperation based on projects. On 10 April, the Ministry of Science and Technology will give its response, at another meeting with the French delegation, and may submit a counter-proposal.

At it, decisions would be made concerning the criteria for participation, the selection of projects, and the financing, based on the national interests. According to Torres, the French want to operate primarily in the agro-food sector.

The French delegation also made contacts with the Brazilian Association of Biotechnology Companies (ABRABI), in Rio de Janeiro, to discuss the commercial development of the scientific research.

Visit to Sao Paulo

Today, the delegation begins a visit to Sao Paulo, where it will meet with the state secretary of science and technology, Luis Carlos Bresser Pereira. The Butanta Institute, Sao Paulo universities (USP [University of Sao Paulo] and UNICAP [Campinas State University]), and that of Minas (UFMG [Federal University of Minas Gerais]) are also included in the program.

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POSSIBLE BRAZILIAN-FRENCH VENTURE

Rio de Janeiro O GLOBO in Portuguese 15 Apr 87 p 32

[Text] Yesterday, Mayor Saturnino Braga received a commission representing small and medium-sized French businessmen from the field of biotechnology, interested in becoming established at Bio-Rio. Aiming at reducing Brazil's technological lag behind more advanced countries, such as the United States and Japan, and those of the European Economic Community (EEC), which amounts to 10 years in the use of modern biotechnology in the pharmaceutical field, and 2 years in the food field, Bio-Rio provided space for the establishment of foreign firms interested in a joint-venture type of association with native companies.

The French were the first ones interested in this kind of association, wherein they will be able to have a minority share of stock and will be obliged to transfer technology to the national partner. Yesterday, however, during the meeting with the mayor, they claimed that it was too soon to discuss any type of agreement for the present; because the French mission sent to Brazil is of an exploratory nature, and its purpose is to make a survey of the Brazilian potential in the field. According to Michel Lelong, representative of the French Ministry of Industry, before giving consideration to an agreement, Bio-Rio must be definitely implemented. But, if any type of cooperation were to occur, it would have to be in the fields of industrial microbiology, fermentation, vaccines, and plant cell culture.

2909
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HUNGARIAN INTEREST IN BRAZILIAN COMPUTERS

Brasilia BRASIL CIENCIA in Portuguese 11 Apr 87 p 4

[Text] Hungary may soon purchase 3,000 computer terminals from Brazilian firms for the purpose of modernizing its banking system. It was to sign an agreement in this connection that the chairman-director of the National Economic Fund of Hungary, Laszlo Tisza, visited the Ministry of Science and Technology in Brasilia on 6 April.

The Hungarians are already in contact with two Brazilian companies (Itautec and SID) to have the agreement implemented. The Hungarian Government's preference for these firms is due to the fact that they have computers which can be connected to the Hungarian banking system. Based on the agreement, the Brazilian companies will have a period of 30 days to submit a commercial bid to the National Economic Fund of Hungary (CEN). Conversely, after studying the Brazilian proposal, and if it meets their needs, the Hungarians will have 60 days to decide on the terms of the purchase.

According to Laszlo Tisza, the National Economic Fund of Hungary currently has 600 banking agencies distributed among the country's 15 provinces. The intention is to make Brazil a major producer of computers for the Hungarian market.

There is also Hungarian interest in signing an agreement with Racimec (a Brazilian firm producing equipment that is now being used to promote the Sports Lottery and Keno). There is a system in Hungary similar to the Brazilian lotteries; somewhich which evoked that government's interest in receiving a bid from Racimec.

2909
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INTEREST PAYMENTS SUSPENSION HURTS BRAZILIAN COMPUTERS

Rio de Janeiro DATA NEWS in Portuguese 9 Mar 87 pp 6, 7

[Text] With the stoppage of payment of the interest on the foreign debt by the government, manufacturers are encountering difficulties in procuring financing lines abroad that would enable them to import electronic components, as stipulated in the Central Bank's Resolution 767.

The Brazilian Association of the Computer Industry (ABICOMP) wants the suspension of the Central Bank's Resolution 767, so long as the difficulties continue in the procurement of credit abroad by Brazilian business firms. As may be recalled, Resolution 767 stipulates that the importing of producer goods (such as components for the computer science industry) must be preceded by the procurement of a financing line abroad, with a payment term of from 3 to 8 years.

The president of ABICOMP, Antonio Luiz Mesquita, wonders: "The Brazilian Government stopped paying the interest on the foreign debt. How are we going to contract new debts? According to Resolution 767, even before we send the import bill of lading to CACEX [Foreign Trade Department], specifying which components we want to import, we have to submit a document from a foreign institution that is willing to finance the operation. We want to be free to pay for imports directly, without financing, at least while we are in this uncertain state."

Effects

Although the foreign manufacturers do not have this problem (their financing sources are their own parent companies abroad), the importing difficulties are affecting their product lines in Brazil, because the native suppliers are not meeting the delivery dates.

IBM-Brazil's communications director, Joao de Paula Correa Neto, remarks: "We are working with a plan that ensures us a margin of from 3 to 4 months of production. We have problems with our suppliers and, concurrently, we have several requests for imports, so that we can carry out our export program. As for the remittances associated with the payment of royalties, it is not a problem affecting us over the short term, because we have no remittances scheduled at the moment."

Interest

According to some businessmen, the stoppage of payment on the foreign debt also has its positive features. Antonio Luiz Mesquita emphasizes that another major problem faced by the productive sector of the economy is the high interest rates. With the funds to be remitted to foreign banks being deposited inside the country, in native currency, there will be a trend toward declines in interest.

Mesquita concludes: "There are bad things that work for the good. With the stoppage of the remittances, and the depositing of cruzados in the banks, we think that there will be more funds for investment."

Another optimistic assessment is that of the new head of the Association of Computer Companies and Services (Assespro-National), Francisco Ramalho. He thinks that, with greater difficulties in importing equipment and components, the users will have to better exploit the resources of the system already at their disposal. At present, the solution is to invest in the development of new and better software.

He explains: "Traditionally, when a system has its processing capacity depleted, the tendency is to migrate to more powerful CPU models. Now, the hardware investment will be made difficult; the solution will be the most logical one: to invest in software. There will remain for the industry the solutions of exporting and investments in nationalization of components and for the support and maintenance areas."

Users

The new head of the Association of Computer and Subsidiary Equipment Users (Sucesu-National), Jose Souto Maior Mussalem, remarks: "I see nothing positive in the stoppage of interest payments on our foreign debt." He thinks that there is already a shortage of equipment manufactured in the country for purchase by end users of these products, given the heating of the economy caused by the original Cruzado Plan. Starting this month, however, the difficulties in maintaining a CPD in operation will increase, because of the lack of imported components and equipment.

Mussalem gives a reminder: "Since January, we have been sensing a very marked lag in the issuance of import bills of lading by CACEX. The government wants to reduce imports in order to generate balances in its balance of payments. Now, with the stoppage of interest payments to foreign banks, we may suffer retaliation. The interbank credit lines of Brazilian banks abroad amount to $15 billion. Without that credit, there will necessarily be a massive reduction in the level of Brazilian imports, to the detriment of the entire economy."

'Little Bag'

Without credit from abroad, and without import bills of lading, there will be left for the user and manufacturer the solution of imports from smuggling.

Microsoft's attorney, Georges Fischer, thinks that illegal imports will necessarily increase, because, officially, they are disregarded, and are not included in the calculation of the balance of payments.

But even this course of action is difficult for Brazilian manufacturers and users, because while the dollar on the black exchange market has its quotation raised every day in relation to the cruzado, abroad the value of the dollar is declining vis-a-vis the other foreign currencies.

Some time ago, most imports of electronic components by Brazil were made only on the American market. With the advent of the Japanese and other Far Eastern countries as suppliers of these products, the entertainment field (manufacturers of TV, sound, and radio sets) has started seeking the equipment that it needs on that market. Now, the manufacturers of computer equipment make more than 60 percent of their imports on the American market, while the United States is used only as a first stage in the exporting of a chip manufacturing country, such as Taiwan, to Brazil.

[Box, p 6]

IBM and UNISYS: Deficit

During the first 10 months of last year, the computer science industry had a negative pressure on the Brazilian trade balance, perhaps preparing itself against potential import problems which actually occurred at the end of 1986 and the beginning of this year.

One of the firms with the largest share in the Brazilian trade balance, IBM, exported $139 million and imported $150 million as of last October, showing a deficit of over $10 million for the year. UNISYS, another leading manufacturer, exported $27 million and imported $44 million; in other words, with a deficit of $17 million.

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